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Analyzing The Behavior Of Individuals With High Uncertainty Avoidance In Relation To The Design Of Online Game-Based Educational Learning Interfaces

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Abstract

With the exponential growth of technology, online educational games has become an intrinsic part of our daily lives, shaping the way we communicate, share information, and interact with one another. Uncertainty avoidance refers to a society's tolerance for ambiguity and the unknown. Cultures characterized by high uncertainty avoidance tend to favor clear rules, stability, and predictability. Within the sphere of the game based platforms, this cultural trait can greatly influence design preferences. Platforms targeting audiences from such cultures might benefit from intuitive interfaces, clear navigation, and comprehensive user guidelines. By offering consistent layouts, routine confirmatory feedback, and a lucid user experience, the comfort level of these users is enhanced. To deliver deeper into this aspect, a questionnaire was sent out to 152 Saudi students. Their responses provided insights into the dynamics of their engagement with the online educational gaming platforms. By comprehending their preferences, behaviors, and challenges on educational and technologists can develop strategies, tools, and educational programs tailored specifically to their needs. This ensures that Saudi students can navigate through these platforms seamlessly and safely, empowering them to harness its potential without encountering the pitfalls it might present. This is not just about understanding their trends, but also about fostering an environment where they can benefit from global connectivity without compromising their cultural values and personal security. As the online educational game platforms expand globally, addressing these cultural nuances becomes paramount for optimal user engagement and retention.

Keyword: Behaviour, Learning, Educational game, Uncertainty Avoidance, User interface.

I. Introduction

In the digital age, educators seek effective methods to engage students and improve learning experiences. Online education games, integrating game elements in non-gaming contexts, has become a crucial tool for fostering student understanding.

Teachers face challenges in capturing and maintaining student attention, especially for digital-native students. Online education games, using points, leaderboards, and badges, taps into the human desire for play, competition, and achievement, boosting student motivation and active involvement in their learning journey.

The online educational game platforms offers a safe environment for students to learn and try again, allowing them to take risks, learn from mistakes, and try again without facing harsh consequences. This approach encourages a growth mindset, where students perceive challenges and mistakes as opportunities for growth and

improvement. Immediate feedback in games helps students identify mistakes promptly, leading to faster rectification and better retention. This real-time response system contrasts with traditional methods, which may be delayed for weeks.

This research focuses understanding how a good user interface (UI) design is crucial in digital platforms, especially the online educational gaming user interface, as it increases user engagement, motivation, and task performance in non-game contexts like education. The effectiveness of online education games relies on the user's experience, which is significantly influenced by the quality of the UI design.

Firstly, our aim was to comprehend the cultural backgrounds of the participants by utilizing Hofstede's dimension of Uncertainty Avoidance. We posed questions concerning their behaviors to ascertain their level of comfort with uncertainty. Analyses indicated that among Hofstede's dimensions, only uncertainty avoidance showed significant correlation with the results. According to Demmler, Ortiz Ayala, and Urbiola Solís (2018), Saudi Arabia's uncertainty avoidance score of 68 highlights the society's limited tolerance for ambiguity. In efforts to mitigate this uncertainty, stringent rules, laws, policies, and regulations are put into effect. The overriding ambition of this culture is to manage every aspect, seeking to eliminate or at the very least, reduce unforeseen outcomes. Consequently, due to this pronounced Uncertainty Avoidance trait, the society is often resistant to change and tends to be risk-averse (Chessum, and Frommholz, 2022).

Secondly, the study seeks to assess the perceptions of Saudi users towards the icon design in the user interfaces of online education games platforms. Lastly, our objective was to understand the preferences of Saudi users concerning their behavior and engagement on the online educational games platforms. All constructs were evaluated using a five-point Likert scale, and an Exploratory Factor Analysis was conducted on all multi-item scales.
Lastly, our objective was to understand the preferences of Saudi users concerning their behavior and engagement on these platforms. All constructs were evaluated using a five-point Likert scale, and an Exploratory Factor Analysis was conducted on all multi-item scales.

The Arabic language ranks fifth among the world's most spoken languages, and daily, a growing number of individuals from Arabic backgrounds engage with interactive platforms (Anbar, 2012). Thus, it's imperative to consider Arabic cultural nuances when designing gamified solutions.

2. Literature review

With the exponential growth of technology, distance learning has become an intrinsic part of our daily lives, shaping the way we communicate, share information, and interact with students and teachers. In this context, it is imperative to understand the dynamics of Saudi students' engagement with these platforms. By comprehending their preferences, behaviors, and challenges on educators and technologists that can develop strategies, tools, and educational programs tailored specifically to their needs.

By reducing hassles and streamlining the learning route, an effective user interface (UI) in educational games dramatically improves the learning experience. The cognitive strain associated with learning how to utilize the software is removed when consumers can move through a game intuitively. This enables students to concentrate solely on the educational material. The menus are rationally laid out,

the buttons are clearly labelled, and the assistance choices are quickly reachable. When educational games are made in this way, students are more likely to experience pride in their learning rather than irritation, which encourages them to keep studying.

This ensures that Saudi students can navigate through the game based platforms seamlessly and safely, empowering them to harness its potential without encountering the pitfalls it might present. This is not just about understanding their trends, but also about fostering an environment where they can benefit from global connectivity without compromising their cultural values and personal security.

Learning has benefited greatly in recent years from the use of information technology for e learning (Lee et al., 2008). In the broadest sense, information technology for distance education is the delivery of teaching over a distance to one or more people who are present in one or more places (Kezar, 2008). With the ability to transmit knowledge to an exponentially greater number of people than ever before, today's new information technologies, notably the Internet, give higher education the biggest megaphone in its history (Bishop and Cates, 2001).

E-learning platforms have the potential to significantly improve access to educational resources and programs (Lwoga, 2014), ease the delivery of instruction (Samsudeen & Mohamed, 2019), and facilitate teaching and learning experiences (Lee et al., 2011). It is a clear requirement that students embrace and effectively use e-learning systems despite significant investments and the mandated restructuring of education.

Additionally, maintaining students' continuity becomes increasingly important even if they begin to use e-learning technologies. Problems with continuing use typically take the form of the adoption process being significantly unsuccessful or the discontinuation of use following the first use (Adelé & Brangier, 2013). Although e-adoption learning is a crucial first step toward these systems' effectiveness, ongoing use is necessary to assure true success (Lee, 2010). In other words, it may be said that the uses that address the initial stages of the process and do not demonstrate consistency throughout time will fall short of achieving the desired outcomes both during and after the epidemic (Şahin et al., 2022). The adoption of these technologies by students is the first step that cannot be compromised in order to fully utilize the potential of e-learning systems, and ensuring that students continue to use them plays a crucial role (Abdullah & Ward, 2016; Lee, 2010).

The game based learning platforms aims to increase user engagement by creating an intuitive, enjoyable, and user-friendly interface. A well-designed UI simplifies complex concepts, making it easier for users to understand rules and engage meaningfully with content. Effective motivation is achieved through badges, points, leaderboards, and achievements, which are prominent, meaningful, and rewarding, amplifying the motivational effect. Overall, a well-designed online education games experience enhances user engagement and satisfaction.

A good UI design ensures smooth user flow, greater accessibility, and increased trust and credibility in a gamified experience. It should include seamless transitions, clear calls-to-action, and an intuitive navigation system. A comprehensive design considers diverse user groups, including those with disabilities, ensuring inclusivity and a wide audience reach. A polished and

professional-looking UI signals investment in time, effort, and expertise, making users more likely to engage with the platform.

A well-designed user interface (UI) is crucial for enhancing user engagement and motivation in online education games. It provides timely, clear, and gratifying feedback, encouraging repeat use and sustained learning. A well-designed UI complements and elevates the narrative, making the experience more immersive and compelling. Investing in good UI design upfront can save costs in the long run, reducing the need for extensive user training, minimizing errors, and reducing the chances of costly redesigns in the future. In summary, a well-designed UI can amplify the positive impacts of online education games, leading to more successful outcomes in educational contexts, business environments, and non-game platforms.

2.1 Understanding Uncertainty Avoidance

Uncertainty avoidance refers to a society's tolerance for ambiguity and the unknown. Cultures characterized by high uncertainty avoidance tend to favour clear rules, stability, and predictability (Hasan et al., 2020). Within the sphere of the online game based learning platforms, this cultural trait can greatly influence design preferences. Platforms targeting audiences from such cultures might benefit from intuitive interfaces, clear navigation, and comprehensive user guidelines. By offering consistent layouts, routine confirmatory feedback, and a lucid user experience, the comfort level of these users is enhanced. As the online gaming platforms expand globally, addressing these cultural nuances becomes paramount for optimal user engagement and retention.

Cultures with high uncertainty avoidance emphasize clarity, structure, and predictability, often shying away from ambiguous situations. In the context of Hofstede's cultural dimensions theory, nations such as Greece, Portugal, Japan, and many Latin American countries score high on uncertainty avoidance. Hofstede’s framework has informed HCI, as evidenced by Marcus (2009) who formulated website design guidelines based on it, and Smith et al. (2004) who integrated Hofstede’s dimensions into their process model. According to research by Chessum et al. (2022), uncertainty avoidance measures a culture's comfort with the unknown. Cultures ranking high in this dimension often anticipate the consequences of actions before taking them. They value navigational structures that prevent users from feeling lost. The use of redundant cues, such as design or auditory aids, reduces ambiguity (Burgmann et al., 2006). Simplicity, combined with coherent metaphors and limited data, is a priority (Marcus and Gould, 2000). As Hofstede (2011) stated, such cultures view life's inherent uncertainty as a perpetual threat. Countries like Saudi Arabia, which scores 80 on this dimension, exhibit a strong aversion to uncertainty (Raees, 2021). In contrast, nations like Belgium and Greece are considered high in uncertainty avoidance, whereas Singapore and Sweden are viewed as more accepting of ambiguity.

2.2 Interface Design Considerations

Interface design, driven by user interaction behavior, elevates the user experience from a fresh standpoint. It goes beyond mere visual design principles; market demands and timelines often result in ornate embellishments in APP interface designs (Nunes et al., 2016). For heightened competitiveness and user traction, excellent interactive experiences paired with lucid interface designs are pivotal. It's vital to establish a distinct theory for the human-machine interface, ensuring user-friendly interactions and straightforward

information transmission. A dedicated design interface theory is sorely needed for guidance (Wu et al., 2022). Interface design zeroes in on user interaction behaviors to amplify the user experience. Enhancing interaction design theory is essential for designers, interaction specialists, and developers (Kim and Lee, 2016). The system accentuates interface visual design and tech development. Some advocate for a unified, process-oriented interface design method, leveraging diverse technologies (Rahmat et al. 2018). The objective is a sleek, modern user interface that normalizes design and lessens the learning curve. Interactive styles should be evolutionary, ensuring user adaptability over time (Awwad and Slany, 2016).

In the evolving landscape of online education, games have become an influential medium for learning. However, there is a noticeable research gap when it comes to tailoring these educational game interfaces to suit the Arabic-speaking populace, particularly in Saudi Arabia. Cultural nuances, linguistic features, and local educational norms are often neglected in the prevalent Western-centric designs. This gap poses a significant challenge as poor interface design can deter user engagement, diminishing the educational value of these platforms. The lack of research focused on the Arabic-speaking users in Saudi Arabia limits the inclusivity and effectiveness of these educational games. Addressing this research gap is crucial for fostering a more enriching and accessible educational environment, catering to the specific needs and preferences of Saudi users. This ensures not only higher engagement rates but also a more effective and fulfilling learning experience.

3. Research Problem and research questions

As technology rapidly progresses, numerous industries globally have shifted to digital techniques, departing from conventional methods. One notable sector that embraced this digital shift is education. Schools and universities globally have integrated information technology applications, with a particular focus on online game- based learning platforms. In response to the COVID-19 pandemic, Saudi Arabia heavily relied on learning online including online education games platforms as the primary educational platform. It served as the virtual classroom, bridging students with academics for communication, learning, and discussions. Previous research highlighted two primary challenges impacting the user interface usage and behavior of Saudi users using online educational games (Almakky, 2015). These challenges encompass language aspects, such as translation and alignment, and cultural factors, like image interpretation and icon representation. This paper aims to delve deeper into users' perceptions and unravel the underlying reasons for these challenges using online platforms for education such as gaming.

3.1 Language Issues

A user who uses the online gaming platforms in Arabic are less likely to not be interested in using it as must of the user interface are not translated in Arabic. However, they are proposed to use it because their friends are using it (i.e. peer effect), which entails the probability of not being very engaged in using the user interface and less tendency to use the settings of the online educational game user interface. All of these elements have been investigated qualitatively in previous research but in this paper it approves it quantitatively using a questionnaire. Therefore, this paper focuses on testing the following hypothesis:

Hypothesis: Saudi users who prefer online game-based learning user interface are more correlated with English interface users than Arabic Users

3.2 Cultural Issues

This section will discuss the other culture issues that were raised in the previous research. Therefore, it has been examined in this research the reason why Saudi users are having issues with the icon and layout positioning in regards to game based online user interface. Therefore, the following will discuss in details of these issues.

Uncertainty Avoidance and Icons

According to the literature, Uncertainty Avoidance culture are less reluctant to try new icons without understanding the consequences of clicking on them. Thus, vague wording or too few texts in the label would give vagueness and inability to know the consequences of clicking on the Icon. Thus, it is proposed that uncertainty avoidance prefer a clear text in labelling than having abstract key words, which may be confusing to them.

Indeed, uncertainty avoidance, because they are against vagueness, prefer the icons with character to help the user knows his future state if he clicks on the icon. This argument is supported by literature (Marcus and Gould 2000); (Marcus and Baumgartner 2004) the lower uncertainty cultures prefer more abstract image whereas high uncertainty cultures prefer showing the position of the user. Which shows in this questionnaire that uncertainty avoidance prefers icons with characters. Because this study is too old to be reliable now, this research replicate this finding but in Saudi Arabia. Therefore, this paper focuses on testing the following hypotheses:

Hypothesis: Uncertainty avoidance prefers text in labelling and character in the icons

3.3 Uncertainty avoidance and Layout Design

Furthermore, vertical designs are preferred for uncertainty avoidance users as it enables users to move smoothly and with perception of control than the horizontal ones (as in the online educational game user interface). Finally, uncertainty avoidance users are discouraged to explore and try new things with the tendency to avoid any complicated things that may lead to unattended consequences. Thus, it is proposed that they are avoiding using setting pages due to its richness of contents.

Hypothesis: Uncertainty avoidance affects learning game-based user interface engagement negatively

Hypothesis: The inclination towards online game-based platforms correlates with student engagement through the user interface, rather than with other online methods.

Hypothesis: Uncertainty Avoidance Prefer Vertical Designs

4. Research Method

Since the aim of this paper is to test hypotheses, questionnaire will be used in positivist epistemology. In other words, unlike other questionnaires used in this paper to describe different elements and factors, this questionnaire aims to use inferential analysis to explain the impacts of culture and perceptions on the level of engagement, perception towards the online game based user interface and usage.

This questionnaire is designed to examine for certain aspects shown in the previous research which are the issues in the understanding users culture dimension, characteristics of designing icons, behaviour towards the online education

game based user interface and their view of its user interface complexity. To ensure item equivalence, a critical consideration in a cross-cultural study of this nature, the English version was translated into Arabic to match the mother tongue of the participants and to prevent confusion.

4.1 Participants characteristics

The questionnaire was sent out to 465 Saudi students and was completed by 152 students. 21% of the students were between 18–25 years, 55% were from 26-34 and 20% were between 35-54 years old. 46% of the them were females and 53% were male. This means that the sample is representative for both males and females. It has not been found any significance evidence that males and females are different in the results and analysis. Additionally, it has not been found significance differences due to the age.

4.2 Operationalisation of Constructs

To test the paper hypothesis, constructs are developed from literature and from previous research results. Indeed, all constructs are tested for validity and reliability before usage. Validity was tested using Factor Analysis using Varimax approach. All factor loads for all items constituting the constructs are more than 0.6 which is accepted in literature. Moreover, the reliability, i.e. the internal consistency of the constructs, is measured using Cronbach's Alpha. All constructs have Cronbach's alpha more than 0.8. Indeed, more than 0.6 is reliable as discussed in literature (Field, 2009).

Previous research have applied Hofstede's cultural typology at the individual level and developed a scale to assess culture values using the personality-centered methodological approach. Therefore, the questionnaire will be using Hofstede (1980) constructs to measure the individuals whether or not they are high or low in high power distance, uncertainty avoidance or collectivist culture. The following tables Items were rated on a five-point likert scale ranging from "Strongly disagree" (1) to "Strongly agree" (5). Table 1and Table 2 will demonstrate the statistics mean and standard deviation with an average mean of 4 and standard deviation is less then 1. It shows that the mean and standard deviations are average of 4 between the questions.

	Mean	Std. Deviation
PD1_1higher positions should make most decisions without consulting people in lower	2.78	1.317
PD2_2higher positions should avoid social interaction with people in lower	2.03	1.133
PD3_lower positions should not disagree with decisions by people in higher	2.48	1.104
PD4_higher positions should not delegate important tasks to people in lower	3.08	1.237
PD	2.5921	.87017
Valid N (listwise)		

Table 1 statistics mean and standard deviation on Power distance

	Mean	Std. Deviation

COL1_ don't like group work prefer working alone	2.09	1.085
COL2_Group work is a waste of time	2.47	1.162
COL3_Individuals should stick with the group even through difficulties	3.34	1.040
COL4_Group loyalty should be encouraged even if individual goals suffer	3.12	1.169
COL	3.2288	.97331
Valid N (listwise)		

Table 2 statistics mean and standard deviation of Uncertainty avoidance questions.

	Mean	Std. Deviation
	Statistic	Statistic
UA1_important to have instructions spelled out in detail	4.07	.929
UA2_It is important to closely follow instructions and procedures	4.20	.731
UA3_Rules and regulations are important because they inform me of what is expected of me	4.36	.685
UA	4.2105	.62530

Table 3 Questionnaire in high avoidance

Therefore, the results show in table 3 that the users who have been participated in this questionnaire are high in uncertainty avoidance with average scope of 4.2. It shows that since the middle point is 3, the current average is significantly higher than it (using t-test comparing sample mean with cut-off point using SPSS as shown below). This validates the results set by Hofstede and literature that Saudi culture has tendency to avoid uncertainties (Table 4).

One-Sample Test							
	Test Value = 3						
	Mean	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
						Lower	Upper
UA	4.2	23.868	151	.000	1.21053	1.1103	1.3107

Table 4 Uncertainty avoidance once sample t-test

4.3 Icon design constructs

This section discusses the icon design constructs of the Saudi users perception on icons whether they like text to be presented in the icon or not. Two groups of icons were presented. The first group of icons was based on an icon that has text and the second group were icons that has no text. Therefore, presenting the two groups together and asking the users whether preferences will help identify users' perception on the icon design contracts. Therefore, a set of 3 questions was asked in each icon, first question was whether the participants like the icon the second question was if the icon is clearly overtones and third question was whether the icon was easy to understand. Therefore, all the questions were based on 5 five-point Likert scale ranging from ""Strongly disagree" (1) to "Strongly agree" (5). Therefore, the overall components results between the two groups were 61%. Table 5 illustrates the all

the responses had similar average mean and standard deviation between the results.

Images		Mean	Std. Deviation
		Statistic	Statistic
	bobble icon to be with text	3.61	1.090
	bubble icon with text is clear overtones?	3.86	1.045
	bubble icon with text is easy?	3.91	.983
	books icon with text?	3.26	1.185
	books icon with text is clear overtones?	3.40	1.108
	Book icon with text is easy?	3.36	1.148
	With text	3.570	
	bubble icon without text?	2.97	1.162
	bubble icon without text is clear overtones?	2.83	1.195
	bubble icon without text is easy?	2.91	1.234
	books icon without text?	3.62	1.072
	books icon without text is clear overtones?	3.41	1.136
	book icon without text is easy ?	3.45	1.109

Table 5 icon design with text and without text (mean and std deviation)

4.4 Icons Character Versus without Character

This section will discuss the same aspect as the section above but this time it will present the icons with character and without character. The reason for these questions was to analyse users perception on their preferences of the icons and whether or not they like the icon to be with or without character. Also asking the participants whether the icons with character or without character help them navigate through them easily or not. Therefore, two types of icons were presented on 5 five-point Likert scale ranging from “”Strongly disagree” (1) to “Strongly agree” (5). Table 6 illustrates the questions similar average mean and standard deviation between the results.

Descriptive Statistics

		Mean	Std. Deviation
Image	Questions	Statistic	Statistic
	Shopping icon to be with character?	3.76	1.037

	Shopping icon with character is easy to navigate?	4.05	.905
	Books icon to be with character?	3.88	1.002
	Books icon with character is easy to navigate?	3.97	.927
	Shopping icon to be without character?	3.02	1.171
	Shopping icon without character is easy to navigate?	3.26	1.188
	Books icon to be without character?	3.30	1.178
	Books icon without character is easy to navigate?	3.09	1.223

Table 6 Icons with character and without character (mean and std deviation)

4.5 Layout Design

This section was to analyses users preferences with layout design menu. There were two types of navigation menu that was presented in the questions Horizontal and vertical menus. The purpose of this question was to understanding users perception on their navigation preferences. Each menu type were presented in three images to assure its reliability of their answer. Therefore, two types of icons were presented on 5 five-point Likert scale ranging from "Strongly disagree" (1) to "Strongly agree" (5).Table 7 illustrates the all the responses had similar average mean and standard deviation between the results.

Descriptive Statistics

		Mean	Std. Deviation
Image	Questions	Statistic	Statistic
	menu 1 to be designed Horizontally?	3.58	1.110
	menu 1 Horizontally is easily to easy to follow?	3.56	1.069
	menu 1 Horizontally is clearly presented?	3.72	1.037

	menu 2 to be designed Horizontally?	3.56	1.169
	menu 2 Horizontally is easily to easy to follow?	3.56	1.075
	menu 2 Horizontally is clearly presented?	3.64	1.124
	menu 1 to be designed vertically?	3.11	1.320
	menu 1 vertically is easily to easy to follow?	3.13	1.299
	menu 1 vertically is clearly presented?	3.19	1.290
	menu 2 to be designed vertically?	3.59	1.159
	menu 2 vertically is easily to easy to follow?	3.70	1.109
	menu 2 vertically is clearly presented?	3.72	1.118

Table 7 Vertical menu design vs Horizontal (Descriptive statistics)

4.6 Layout design (of the online educational game tinyTap, Lingo and KooBits)

This section illustrates the question regarding the layout design of tinyTap, Lingo and KooBits. The purpose of this question was to analyze users perception on their overview design preferences. This will help this research compare the results and understand users preferences of each design. The layout design were presented as an image and each participants were asked whether they like the layout and whether they find the layout is easy to navigate. Each question were presented on 5 five-point Likert scale ranging from "Strongly disagree" (1) to "Strongly agree" (5).Table 8 illustrates the all the responses had similar average mean and standard deviation between the results.

Descriptive Statistics

		Mean	Std. Deviation
images	Questions	Statistic	Statistic
	Do you like tinytap image layout?	3.21	1.043
	Do you think tinytap layout is too much complex?	2.79	1.049
	Do you think tinytap image layout is easy to navigate?	3.31	1.056

	Do you like Quizizz user interface image layout ?	3.37	1.002
	Do you think Quizizz user interface image layout is too much complex?	2.62	1.103
	Do you think Quizizz user interface image layout is easy to navigate?	3.48	1.061
	Do you like edutechnoz image layout?	2.82	1.148
	Do you think edutechnoz image layout is too much complex?	2.80	1.100
	Do you think edutechnoz image layout is easy to navigate?	3.09	1.100
	Do you like KooBits image layout?	3.99	.924
	Do you think KooBits image layout is too much complex?	2.30	1.185
	Do you think KooBits image layout is easy to navigate?	3.99	.952

Table 8 Online education game user interface layout design (Descriptive statistics)

4.7 Game-based Interface density Versus Perception quizizz complexity

Online education game design user interface density is referred in this research is when the page has too many navigation options, menus, icons, rich of information in the layout. However, perception of the online user interface of tinyTap, quizizz and KooBits complexity it means that the layout design has too many data, icons and option information.

First group, has 4 sets of questions. Each set of questions were to understand users perception on how much layout density the users prefer when interacting with online educational sites. The first question were based how many menu and icons they prefer in the page. The second question were based on whether they prefer many features (ie different color; style size etc..). The third question were based on how much information they prefer in the same time (ie friends news, images etc…). Forth question was based on whether the user prefer too rich in data and information all in one page. Therefore all four questions were presented as five-point Likert scale ranging from “only one kind” (1) to “too many kinds”(5).

However, Perception of online educational game user interface complexity is based on the users' perception whether they find the online educational games user interface layout in their perception too complex to use or not. Therefore questions such as too much data, icons and information were presented individually and using a five-point Likert scale ranging from “strongly disagree ” (1) to “strongly agree”(5). Table 9 and Table 10 demonstrates a descriptive statistics between the mean and standard deviation.

Descriptive Statistics

Questions	Mean Statistic	Std. Deviation Statistic
Prefer online educational games to have many navigation options?	2.50	1.584
Prefer online educational games to have many options?	2.56	1.461
Prefer online educational games to have many menu and icons	2.97	1.539
prefer online educational games to have many features (color, text style, size?	2.92	1.558

Table 9 Questions of the online educational games user interface density (descriptive statistics)

Descriptive Statistics

	Mean Statistic	Std. Deviation Statistic
tinyTap, Quizizz and KooBits user interface has too much data in the interface?	3.39	1.123
tinyTap, Quizizz and KooBits user interface has too much icons?	3.32	1.177
tinyTap, Quizizz and KooBits user interface has too much option?	3.22	1.179
tinyTap, Quizizz and KooBits user interface has too much information?	3.28	1.177

Table 10 questions of online educational games user interface complexity (Descriptive statistics)

4.8 Game-based educational games Behaviour (tinyTap, Quizizz and KooBits)

Therefore, this section will analyze users behavior towards online educational games. The purpose of this question was to analyze the users engagement with different online educational games such as tinyTap, Quizizz and koobits user interface. To compare the results and understand their behavior towards all online educational game user interface. The set of questions were based on how many times they play these games. All the questions were based on a likert scale from (1) to be "Yearly" to (5) "All the time". This will help identify users' usage with other online educational games sites to compare them with the three online educational examples mentioned above user interface usage. Therefore, Table 11 illustrates a descriptive statistic between the questions that were conducted in tinyTap, Quizizz and Koobits. Which indicates that the results had similar mean and standard deviation on each question.

Descriptive Statistics

	Mean Statistic	Std. Deviation Statistic
open tinyTap	3.32	1.349
Play with someone in tinyTap	3.24	1.261
Share your experience with friends about TinyTap	3.72	1.236
open Quizizz	3.60	1.246
Play with someone in Quizizz	3.47	1.291
Share your experience with friends about Quizizz	3.57	1.325

Open koobits	3.61	1.180
Play with someone in Koobits	3.07	1.379
Share your experience with someone in Koobits	3.72	1.258

Table 11 Users engagement between the online educational game(Descriptive statistics)

5. Analysis

The analysis starts by profiling Saudi Arabian user preferences followed by testing the paper hypotheses.

5.1 Profiling Saudi Arabian user preferences

The design components recognized as potential challenges in societies with high levels of uncertainty are examined in this study. The online educational games is characterized as complex interface with many options, and information. It also includes a layout designed that has horizontal menu, and icons with no character and it also have a very abstract labels used to define the icons.

Therefore, in this section, it is compared between Saudi who prefer these current elements of the interface design of the online educational games with Saudi who prefer the other side of the designs (i.e. vertical interface design, character in the icons and detailed labeling for icons). Table 7 illustrates the paired sample that has been found that the differences in all aspects are significant with P<0.00. Furthermore, as expected from the previous research, because of the issues and problems with translation in the Arabic version, Saudi people prefers the English version even though their English skills are not as high as Arabic language their mother tongue.

Paired Samples Test

		Paired Differences			t	df Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean		
Pair 1	With character – without character	.85197	1.04982	.08515	10.005	.000
Pair 2	With text – without text	.36842	1.27228	.10320	3.570	.000
Pair 3	Horizontal - vertical	1.63246	1.67299	.13570	12.030	.000
Pair 4	Online educational game user interface Arabic layout - Online educational game user interface English layout	-.889	2.427	.202	-4.395	.000

Table 12 Paired sample of design elements of Online educational games user interface

Indeed, due to the nature of uncertainty avoidance of Saudi people, the sample respondents do not prefer the online educational games interface to be crowded with many options and hyperlinks (P<0.00). Therefore, when they were asked about the perception weather the Online educational games user interface is too complicated and too overwhelming, the answer is significantly higher than the middle value (which is 3 because the scale is 5 points) (P<0.00) (See Table 13).

	Test Value = 3				
	mean	t	df	Sig. (2-tailed)	Mean Difference
Online educational game page density	2.6	-4.313	137	.000	-.37198
TinyTap, Quizizz and KooBits games_complexity	3.3	3.474	149	.001	.30667

Table 13 Saudis perception of the difference between Online educational game density vs in tinyTap, Quizizz and Koobits complexity

Therefore, to summarize, Saudi users have different preferences on the design of Online educational game user interface because of they are considered high in uncertainty avoidance. As illustrated in Table 14 high uncertainty prefer the icons to be design with character, with detailed text in the labels, they also like vertical menu design and do not like Online educational game crowdedness (ie menu and options in the same page). Therefore, each element will be discussed statistically in the following section in more details.

	Saudi Arabia User	Online educational game user interface Design	Proposed reasons
Icons with character/ Icons without character	With Character	Without Character	Uncertainty Avoidance
Labelling with detailed text/ Labelling with abstract text	Labelling with detailed text	Labelling with abstract	
Vertical/Horizontal	Vertical	Horizontal	
Online educational game Density	Do not prefer online educational games density	tinyTap, Quizizz and KooBits user interface is full of information and icons in the page.	

Table 14 Saudi design preferences and proposed reasons

5.2 Cultural Issues

The aim of this section is to test the impact of uncertainty avoidance on the tinyTap, Quizizz and KooBits user interface engagement. Indeed, the uncertainty avoidance, as examined in the next sections, affects the users' preferences in the layout design and icons design.

H2. Uncertainty avoidance affects Online educational game user interface engagement negatively

This hypothesis is tested and found it is valid. This research found a significant negative relationship and a negative significant impact on the Online educational game user interface Engagement. Therefore, it has been identified that Online educational game user interface engagement is significantly negatively associated with Uncertainty Avoidance by 25% ($P<0.05$). Thus, using regression analysis, uncertainty avoidance is significantly affecting the tinyTap, Quizizz and KooBits engagement by 0.191 $p<0.05$ (See Table **15**).

The reason for this negative relationship and impact could be because of different

psychological (e.g. being shy to share or having a virtual social existence on the online educational games) and design factors. In this research, the scope is mainly about the design factors.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	R
	B	Std. Error	Beta			
(Constant)	3.851	.159		24.196	.000	.25
Online educational game user interface Engagement	-.105	.044	-.191	2.381	.019	

Dependent Variable: UA

Table 15 online educational game engagement that is negatively associated with UA

In this study it has been identified that Saudi culture is high in uncertainty avoidance and do not like to be engaged with Online educational game user interface. First, is the design of text found in labeling. Currently Online educational game user interface has limited text that is found in each labeling for each icon, which can be vague to Saudi users as discussed in the previous research. However, uncertainty avoidance culture prefers icons with detailed text not abstract text as it is now in the online educational game user interface. Secondly, it has been found that Online educational game user interface users do not prefer icons with character. However, unlike the hypothesis, users with high uncertainty avoidance do not mind whether icons have characters or not. Although it is hypothesized that uncertainty avoidance could be the reason, it has not been found any relationship between them. Thirdly, it has been found that users who are high in uncertainty avoidance prefer the vertical designs not horizontal designs as the current edition of the Online educational game user interface. The design element reasons can be summarized in the following

Table **16**. **Correlations**

Pearson Correlation

	Online educational game user interface	Uncertainty avoidance	Reflection on the design
Online educational game user interface	1	-.191*	UA users do not prefer engaging the online educational game user interface

With text	.003	.232**	UA prefers Icons with text whereas the tinyTap, Quizizz and KooBits users who does not care the use of the text.
With character	-.236**	.097	tinyTap, Quizizz and KooBits users does not prefer icons with Character but Uncertainty avoidance do not mind
Vertical	-.043	.192*	UA prefer the vertical designs but the tinyTap, Quizizz and KooBits user interface is Horizontal design.

***. Correlation is significant at the 0.05 level (2-tailed).**

Table 16 Saudis perception of design elements (correlations)

5.3 Uncertainty Avoidance prefer text

H5: Uncertainty avoidance prefers text in labelling of the icons

This hypothesis is tested and found that there is a significant relationship between the uncertainty avoidance and preferring text in labeling. Indeed, the impact is 0.283 with P<0.00 and the explanatory ratio is 7%. In other words, 7% of the preference to see text beside the icons is due to the uncertainty avoidance (See Table **17**). Indeed, the current version of the online educational game user interface has abstract texts such as Pictures, Mobile, Settings, Friends without mentioning what will happen if they click on them.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	R^2
		B	Std. Error	Beta			
1	(Constant)	1.983	.508		3.903	.000	.07
	UA	.431	.119	.283	3.612	.000	

a. Dependent Variable: With text

Table 17 UA prefer text in labelling in each icon

5.4 Uncertainty Avoidance and Layout Design

H3. Preferences of Online educational games density is associated with the online educational game user interface engagement not with other online educational games such as tinyTap, Quizizz and KooBits.

The relationship between preference of the online educational game density and the user interface engagement is significant. The impact is significant 0.267 (P<0.01) with correlation ratio of 14.9% (See Table **18**). This relationship is self-explanatory because the online educational game user interface has many options, icons, hyperlinks and ads.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	R
		B	Std. Error	Beta			
1	(Constant)	4.264	.263		16.224	.000	.149
	Online educational game density	.302	.093	.267	-3.232	.002	

a. Dependent Variable: tinyTap, Quizizz and KooBits _Engagement

Table 18 preferences of online educational games density is associated with online educational user interface engagement

However, this density is not preferred by all Saudi People. As seen in the following table, the sample score in preference of the online educational games density is 2.63 which is significantly lower than the middle point of scale (3) with t value of 4.313 (P<0.00) (See Table 19).

One-Sample Test

	Test Value = 3						
	mean	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Online educational game page density	2.63	-4.313	137	.000	-.37198	-.5425	-.2014

Table 19 online educational game density not preferred to all Saudi users

Hence, there's an anticipation that Saudis might find certain online educational game interfaces challenging. Such challenges could make them more inclined to use specific online educational game interfaces over others. A simple linear regression test revealed a significant relationship with a negative coefficient of -0.294 and a determination ratio of 0.294. The P-value is less than 0.00 (See Table **20**). In other words, Saudi people prefer pages to be simpler than that as they are not demanding a huge level of information at a time. They prefer less volume of options and data at a time.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	R
	B	Std. Error	Beta			
(Constant)	4.314	.278		15.519	.000	
tinyTap, Quizizz and KooBits _complexity	-.298	.080	-.294	-3.728	.000	.294

a. Dependent Variable: prefer Online educational games user interface

Table 20 Saudi users who prefer less tinyTap, Quizizz and KooBits complex with negative impact

It was hypnotized early in this paper that uncertainty avoidance is the determinant of this preference of simple pages. However, after testing hypothesis, it has been found a relationship between uncertainty avoidance and negative preferences towards online educational games density (P=15.7%) But not necessary with perception of Online educational games user interface complexity (P=42.8%) (See Table **21** and Table **22**).

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	R
	B	Std. Error	Beta			
1 (Constant)	3.775	.602		6.272	.000	
UA	-.113	.141	-.065	-.795	.428	.065

a. Dependent Variable: tinyTap, Quizizz and KooBits _complexity

Table 21 UA culture prefer less complex interface

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	R
		B	Std. Error	Beta			
1	(Constant)	1.774	.606		2.926	.004	
	UA	.202	.142	.121	1.424	.157	.121

a. Dependent Variable: online educational game_page_density

Table 22 UA and the online educational game density

H4: Uncertainty Avoidance Prefer Vertical Designs

It is hypothesized earlier that high uncertainty avoidance is associated positively with preference of vertical design menu. The regression analysis approved this relationship to show the impact of.192 with P<0.05 significant with a significant determination ratio of 19.2% as shows in Table **23**.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	R
	B	Std. Error	Beta			
1 (Constant)	2.145	.532		4.029	.000	.192
UA	.300	.125	.192	2.395	.018	

a. Dependent Variable: vertical

Table 23 UA culture prefer vertical design

Indeed, it has not been found that vertical preferences affect the online educational game interface preferences the P is 0.895 which means there is no any relationship (See Table **24**). The reason for that is the online educational game user interface is mixing between vertical and horizontal layout designs in different pages. It is not fully vertical nor horizontal. It is mixed.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.052	.322		9.469	.000
	vertical	.081	.091	.073	.895	.372

a. Dependent Variable: prefer online educational game user interface

Table 24 vertical menu design is associated with users who prefer the online educational game user interface.

5.4 Language Issues

Saudi users have issues in regards to the Arabic layout of Online educational games user interface due to its translation and other language issues. Therefore it has been hypothesized that the preference to use the Online educational games user interface is more correlated to the English Interface users than the Arabic Interface users.

H1: Users who prefer online educational game user interface are more correlated with English interface users than Arabic Users

Quantitatively, there is a significant correlation between the users who are using the English version with preferring the Online educational games user interface (r=31%, P<0.00). Nevertheless, there is no correlation between the Arabic online educational game user interface users and the preference of the Online educational games user interface. This proves the hypothesis that Arabic online educational game user interface users are not using the Online educational game user interface because they prefer it; may be because they are using it as they are motivated for other reasons such as the peer effect of others who are using, because others reasons for motivations as discovered in the previous research; but not because of having a positive attitude towards it.

Indeed, preference to use the online educational game user interface is the key determinant for engagement in using the Online educational games user interface (r= 53%, P<0). Therefore, the online educational game user interface English Interface users are more engaged (r=15.4%, P<0.1) than the Arabic interface users (r=-2.9%, P>0.1) (See Table **25**) . This approves the previous research findings that the Arabic interface has issues affecting the users' perception towards the online educational game user interface which in turn leads to less engagement in using the Online educational games user interface.

Correlations

Pearson Correlation

	TINYTAP, QUIZIZZ AND KOOBITS GAMES Engagement	Online educational games user interface Arabic layout	Online educational games user interface English layout	prefer Online educational games user interface
Online educational games user interface Engagement	1	-.029	.154*	.530**
Online educational games user interface Arabic layout	.029	1	-.480**	.034
Online educational games user interface English layout	.154*	-.480**	1	.311**
Prefer Online educational games user interface	.530**	.034	.311**	1

**. Correlation is significant at the 0.01 level (2-tailed).

Table 25 Users who prefer Online educational games user interface are more correlated with English layout

6 Summery

This paper was aimed is to understand how Saudi culture perception who are considered to be high in uncertainty avoidance uses platforms.

It is crucial to publish studies on the interfaces of online educational games that emphasize uncertainty avoidance in Arabic culture for a number of reasons. First off, many Arabic cultures, like Saudi Arabia's, are profoundly rooted in the idea of uncertainty avoidance, which is defined by a society's tolerance for ambiguity and uncertainty. This cultural characteristic may have a big effect on how users interact with and take in educational games. Second, a culturally insensitive user interface can cause people to misread or even reject the educational material, which would be counterproductive for the tool's intended use as a teaching tool.

Developers can increase user engagement and instructional efficacy by designing interfaces that feel intuitive and comfortable to users by understanding the Arabic culture's elements of uncertainty avoidance.

This online educational game study identified that there is a significant relationship between users who have issues with tinyTap, Quizizz and KooBits user interface and uncertainty avoidance. Therefore, issues such as layout design and icon understanding is due to their perception of culture towards the design. Indeed, it has been analysed that issues with design causes negative behavior towards icon understanding. It has been identified that users with high uncertainty avoidance prefer mix of horizontal and vertical menu and icons to be presented with character (see
Table **26**) . Therefore, future research of this research is to develop another questionnaire to help design a prototype design. It will cover design aspects of the layout design and language translation issues found in tinyTap, Quizizz and

KooBits user interface. It will then evaluate the results by conducting Focus group.

Hypothesis	Accept/Reject
Uncertainty avoidance affects tinyTap, Quizizz and KooBits user interface engagement negatively	Accepted
Uncertainty avoidance prefers text in labeling of the icons	Accepted
Preferences of density is online educational game ssociated with tinyTap, Quizizz and KooBits user interface engagement not with other online educational games such as twitter or instgram	Accepted
Uncertainty avoidance prefer vertical design	Reject. The results are not fully vertical nor horizontally. It is mix
Users who prefer tinyTap, Quizizz and KooBits user interface are more correlated with English interface users then Arabic users	Accept

Table 26 summery of Hypothesis results

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