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Arab Preschoolers, Interactive Media and Early Literacy Development

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***Abstract*---This paper discusses the causes, extent and implications of the digital language divide in technologies used by young Arabic-speaking children by the example of Egyptian preschoolers. The discussion is based on two studies: A preliminary survey examining the nature of Egyptian preschoolers' use of technology and an analytical evaluation of representative Arabic literacy developing applications available for Egyptian children compared to their English counterparts.**

***Index Terms*---educational technology, user-centered design, user interfaces**

I. Introduction

In the Arab World, as in many other parts of the world, a lot of parents are struggling to preserve the cultural identity of the new generation in the digital age. Designing interactive digital media for young children is a challenging task loaded with a major moral responisibility as it affects their development at a very delicate stage in their lives. Content localization is an important aspect in this regard: As J.P. Hourcade explains in [1], "If user interfaces and content do not adjust to local cultures, they may have a very negative impact on the perception of technology and its use."

II. Background

A. Preschoolers and Touch Interaction

Touch screen devices allow for a much easier interaction for preschoolers than any technology to-date [2]. According to a very recent study [3] which was carried out in August 2012 by the NPD Group, media tablets experienced the highest increase in usage among kids ages 4-14 at 13 percent in 2012 with usage highest among younger children. As no research was found on Egyptian children's use of touch screen devices, our preliminary survey can serve as a glimpse into the extent by which touch applications targeting preschoolers will actually be used by Egyptian preschoolers at the current time.

B. Technology and Emergent Literacy

Learning to read is a lengthy and complicated process involving different cognitive skills and beginning very early in development. Preschoolers start to develop a basic understanding of letter–sound relationships before formal reading instruction begins at school. According to the NELP Report of the American National Institute for Literacy [4], early literacy skills in the preschool years can be a strong predictor of later literacy development at school. Several studies demonstrated that, at this stage, technology can be used as an effective tool to promote early literacy by fostering phonemic awareness [5], [6], [7], [8]. The authors of [9] lists the areas where computers can help in young children's literacy development as follows: computers 1) support writing 2) contribute to the development of phonological abilities 3) enable more independent reading 4) foster social interaction and collaboration 5) enhance instruction and introduce new literacy skills and awareness. In this research, we focus on the preschoolers' ability to recognize letter-to-sound correspondence.

C. The Digital Language Divide

Language constitutes a basic element of cultural identity and the linguistic changes occurring as a result of globalization are likely to influence the cultural identity development of future generations. "Isabelle Duston, Founder of "Apps of All Nations", commented on USAID's "All Children Reading" challenge by saying: "Given that only 5% of the world's population are native English speakers, it is important that digital learning programs for literacy are made available in a variety of languages, not only in English".The Arabic Language is ranked ninth in the top ten languages in terms of penetration on the internet [10]. Egypt is the most populated Arab country and has the largest number of Internet users in the region. Only seven Arab websites are in the top 1000 internet sites, three of which are from Egypt [11]. Indicating that most Arabic-speaking Internet users still prefer Arabic as the language for internet sites, a study in 2012 [11] recommended the investment in the creation of Arabic digital content to increase adoption of internet by Arab users. Yet creating Arabic content does not only mean translating foreign content but rather handcrafting authentic, localized content which reflects the Arab culture, especially when it comes to education and literacy. We need to teach children to read in their native language. One good example of content localization is a non-profit organization, ilearn4free, which was founded in 2010 with the goal of producing new products designed from the beginning to be localized into several languages, especially targeting children in developing countries.

III. Motivation for the study

With the world turning into a global village and with new emerging technologies intruding into our homes, our children's learning will never be the same again.This study is intended to shed the light on current trends of digital media use by Egyptian preschoolers, examine the quality of available applications teaching the Arabic Alphabet and compare it with their English counterparts. The results should help us make decisions that ensure the digital age works for us!

IV. Methods

A. Survey: Egyptian Preschoolers, Literacy and the Digital Age

This survey was essentially needed as the latest related Egyptian study we found was in 1997 [12]. Obsurvey.com was used to create two online surveys, an English version and an Arabic version, with identical questions. The survey was publicized using facebook social website and participants chose to fill either the English or the Arabic version. One hypothesis of this survey is that having more popular applications for Arabic-speaking preschoolers in English than Arabic negatively affects their Arabic literacy development. The survey questions covered several topics like attitude of participants towards preschoolers use and ownership of interactive media devices and its effectiveness in developing their skills as well as how they chose content for their preschoolers, preschoolers' technology using habits, preferences and ease of interaction, quality of available software and preschoolers' abillity to identify English and Arabic letters, respectively.

1) Participants: An on-line survey was fielded in August 2012 to a representative sample of Egyptian male and female adults who either have preschoolers (aged 3-5) in the household or are preschool teachers. A total of 137 completed surveys, of which 19 were discarded for incomplete or contradicting answers, served as the basis for analysis. 69 participants were mothers of preschoolers, five were fathers of preschoolers, 39 were close relatives to a preschooler and five were teachers at a nursery. Because of the nature of the on-line survey, all the participants have an on-line access and are active facebook users. Thus they are not representative of all Egyptians. Furthermore, From the 118 surveys considered for analysis, 49 participants were from Cairo and 69 from Alexandria.

2) Results and Analysis: When displaying the results of the survey, we chose to not always combine the results of both the Arabic and the English survey, although initially intended. The reason for this is that the percentages of both surveys came out different in certain questions. This could be due to the fact that people who preferred to fill the English survey may have differences in education, social status or preferences when choosing content for their children than those who chose to fill the Arabic survey. So we will occasionally show results for both surveys separately. For convenience, *we will use the acronyms ESP and ASP for "English survey participants" and "Arabic survey participants", respectively*

a) Devices in Household: Figure 1 shows the devices owned by ESP/ASP, respectively.

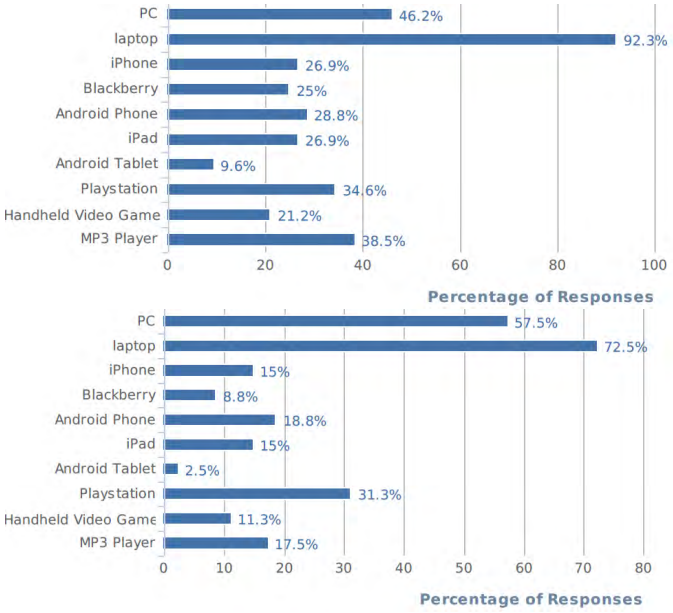


Fig. 1: Devices owned by participants in the English/Arabic survey, respectively

Laptops and PCs are still the most dominant devices owned, followed by Video Games and MP3 Players. Mobile Phone ownership differed significantly between ESP and ASP with the ESP owning more mobile devices.

b) Attitudes of participants:

- 15% of all participants are against such type of media exposure to children at this young age (10% of mothers, 40% of fathers, 0% of nursery teachers and 23% of close relatives), 52% think it depends on content and 21% think it depends on duration of exposure.
- 85% of all participants think digital technology can be effective in teaching preschoolers important concepts/topics.
- About 35% of all participants indicated that the preschooler owns his own computer or mobile device and 40% of parents are not willing to buy their preschool child his own device, the rest are still undecided.
- Almost all owners of tablet devices let their preschool children use them, while only 87% of regular touch mobile phone users let their preschool children use them.

c) Preschoolers' technology using habits:

- 32% of all participants indicated that the preschooler spends less than one hour on a typical day using these devices, 45% spent from one to three hours daily and 23% spent more than three hours daily (note that these exposure times don't include watching TV).
- About half of all participants indicated that the preschooler usually uses these devices together with an adult, about one third indicated that he/she usually uses

them alone and the rest indicated that he/she usually plays together with another child.

- When asked which interactive media the preschooler uses more often, 20% of all participants chose CD programs, 50% of ASP chose internet websites whereas 50% of ESP chose Mobile apps.

d) Ease of Use:

- 15.6% of participants (24.3% of ESP and 10.2% of ASP) indicated that the preschooler attended a special course to teach him how to deal with computers.
- In terms of ease of use for preschoolers, the devices were ordered as follows 1) touch screen devices 2) PCs 3) laptops.

e) Content Selection and Acquisition:

- The categories of content which participants chose for their preschooler was ordered as follows: 1) English Educational Content 2) Arabic Educational Content 3) Non-Educational Games 4) English Songs and Video Clips 5) Arabic Songs and Video Clips
- The educational topics which participants chose for their preschooler was ordered as follows: 1) Reasoning skills 2) Shapes and colors 3) Religious Content 4) Early Reading Skills 5) Numbers and Counting 6) Social Skills 7) Music
- When asked how they acquire software for their preschoolers, 31% of all participants indicated that they only download pirated software from the internet (Arabic Forums), 22% of all participants indicated that they only buy it and 47% do both.

f) Preschoolers' preferences:

- About 70% of all participants indicated that preschoolers prefer interactive technology to traditional toys and books.
- For preschoolers who have several choices of digital devices, their favorite devices were ordered as follows: 1) iPad/Android tablet 2) laptop 3) PC 4) iPhone/Android phone 5) Playstation/Handheld Video Games.
- The top favorite satellite channels of preschoolers were ordered as follows: 1) MBC3(for ASP)/Baraem (for ESP) 2) Baraem(for ASP)/MBC3(for ESP) 3) Toyoor Al-Jannah 4) Spacetoon
- The top favorite websites of preschoolers were ordered as follows: 1) Youtube 2) Nickelodeon & Disney Junior 3) Baraem & Spacetoon 4) PBSKids & Sesame Street.
- The preschoolers' favorite media activities were ordered as follows: 1) games (50%) 2) puzzles and similar activities 3) coloring 4) videos and songs 5) stories.
- The order of features which attracts preschoolers to a certain website or application was found to be as follows: 1) cartoon characters 2) audio and songs 3) colors and design 4) containing more activities 5) simplicity and ease of use.

g) Preschoolers' ability to identify letters: In this set of questions we had the most noticeable differences between the results of the English and Arabic versions of the survey. Figure 2 shows the differences in the preschoolers' ability to recognize the Arabic vs the English letters.

Furthermore, the following results were obtained:

- 50% of the preschoolers learn the Arabic Alphabet at their regular nurseries while 16% go to a special nursery to learn the Arabic Alphabet.
- 25% of ASP vs. 9% of ESP teach their preschool children the Arabic letters at home.
- 78% of preschoolers of the ASP vs. 66% of those of the ESP can sing the Arabic Alphabet song with 53% of ASP vs. 18% of ESP who can sing all of it. However, both had a percentage of 25% who can't associate any Arabic letter with its sound.
- 75% of preschoolers of the ASP vs. 92% of those of the ESP can sing English Alphabet song with 53% of ASP vs. 61% of ESP who can sing all of it. 32% of ASP vs. 17% of ESP can't associate any English letter with its sound.

h) Quality of available software: Figure 3 shows how survey participants rate available software for teaching the English and Arabic Alphabet, respectively, which clearly shows the quality gap between them in favor of the first category.

In addition, when asked if they think we need more Arabic Apps targeting preschoolers, 76% of all participants answered yes.

i) Participants' Comments: The following are the most valuable participants comment on the survey:

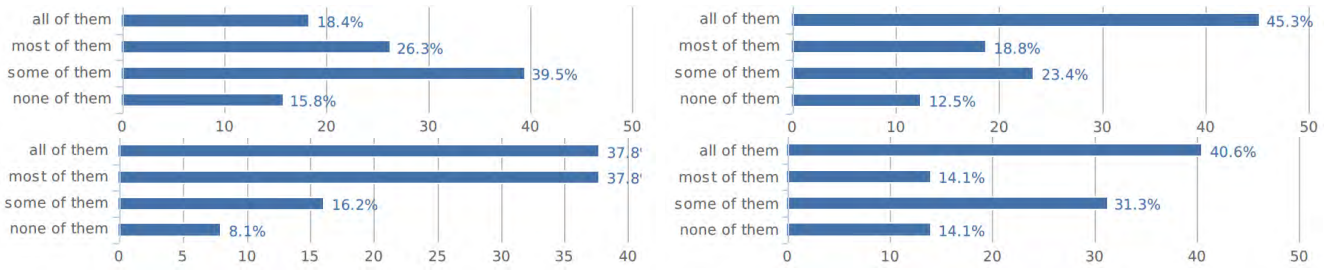
- "Need more activities and applications that use a moderate Arabic language which is not too colloquial neither too classical as in cartoons in Baraem, ICC..etc."
- "Due to the fair quality of the software teaching in most of preschools, i know many children who still can't say the Arabic alphabet although they reached grade 2 or 3"
- "xbox, wii and on-line games are most important to preschoolers today"
- "If you develop programs for preschoolers make them free of charge so that all parents can have a chance to help develop their children."
- "I highly recommend teaching children Arabic in nurseries instead of having English as the main language as I see in most nurseries."

B. Evaluation of Available Early Literacy Applications

1) Hypothesis: It is expected that there is a huge gap in quality and features between software intending to teach preschoolers the Arabic Alphabet and similar English software.

2) Selection of Representative Applications: For this evaluation we have only considered software intended to teach preschoolers Arabic (and English, respectively) letters names and sounds (word spelling and letter tracing features were not considered).

3) Evaluation Instrument: Children's Technology Review *(will be abbreviated as CTR)*, which has been reviewing



ESP Results ASP Results

Fig. 2: Preschoolers' ability to identify Arabic(upper charts)/English letters(lower charts), as indicated by ESP and ASP

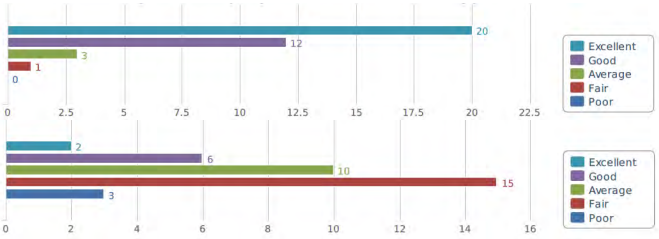


Fig. 3: How survey participants rate available software for teaching the English (upper chart) and Arabic (lower chart) Alphabet

interactive children's media since 1985, uses a systematic assessment system for evaluating children's software, Children's Interactive Media Evaluation Instrument (CIMEI) [13]. The instrument measures five factors that apply to most children interactive media experiences: ease of use, educational value, entertainment value, design features, and value with relation to cost. Each of the five categories is evaluated by a set of questions which are given one of three ratings: (always, to some extent, never). To get a one-to-five star rating, the reviewer then adds up the points of all questions in each category (always = 1 point, some extent = .5 points, never = 0 points, and N.A. = Not Averaged) and then divide by the number of items in the category. All categories percentages and averaged again to obtain an overall percentage which is then converted to a 0 to 5 scale. CTR editors typically recommend programs that receive a 4.2 star rating or better. [1]

4) Procedure:

a) English Software: To choose a representative sample of software teaching English letters for comparison, we used the on-line rating database of the Children's Technology Review. 164 ratings matched our purposes (software teaching preschoolers the English letters' names and sounds). The review dates range from 1993 to 2012. As for the platforms involved, there were 150 desktop applications, 11 iPad and iPhone Apps and 7 websites (Leapster, Leappad, Wii and other smart toys and TV-based games were not considered in this study, because of the absence of Arabic counterparts).

b) Arabic Software: Due to the small number of Arabic applications in this category compared to the English ones, we attempted to evaluate as many programs teaching Arabic Alphabet as we could, from inside and outside Egypt, to ensure proper representation of the state. 15 desktop applications, 8 websites and 7 mobile apps were evaluated using the CIMEI instrument.[2]

5) Results & Analysis: Table I shows a summary of the results of the queries on CTR ratings of software teaching preschoolers the English letters.

Date	Products	Av. Price	Av. Rating
1993-1995	36 desktop apps	$38,19	3.23
1996-1997	33 desktop apps	$30.94	3.87
1998-1999	36 desktop apps	$31,06	3.89
2000-2003	40 desktop apps	$32,50	4.09
2004-2009	9 desktop apps 6 websites	$39,91 $2	4.37 4.43
2010-2011	1 desktop app 1 website 11 ipad apps	$40 $8 $2,27	0.8 4.5 3.85

TABLE I: Summary of CTR CIMEI Ratings Query Results for English Software

As can be seen from the table, since 2004 desktop applications, in this category, have been more and more replaced by mobile applications. The ratings of desktop applications have been linearly increasing since 1993 and have developed to a relatively high standard which mobile applications haven't achieved yet as developers are still "exploring" the new medium: The quality of ipad apps now, in our chosen category, have ratings similar to desktop applications back in 1996. Ipad apps are also much cheaper than desktop applications, which gives more people the chance to use them.

Table II shows a summary of our evaluation results of Arabic software teaching the Arabic Alphabet.

It is interesting to note that according to the average CIMEI ratings in both tables, the status of Arabic software in this category is even worse than the status of its English counterparts back in 1993. This huge gap emphasizes the digital language divide in this category of software.

[1] As of the time of writing of this paper (August 2012), "Yogiplay" has just released a new rating system for early learning mobile apps called "YogiMeter". We are waiting to get more detailed insight on how the rating system works.

[2] A detailed evaluation with application names and snapshots is available.

Products	Max. Rating	Av. Rating	Min. Rating
15 desktop apps	3.61	2.80	1.18
8 websites	3.06	2.49	1.83
7 mobile apps	3.58	2.47	1.33

TABLE II: Summary of our CIMEI Ratings of Arabic Software

V. Discussion

A. Egyptian Preschoolers and Interactive Media

About half of preschoolers whose parents or caregivers participated in the survey use smart phones. Participants indicated that touch screen devices are the easiest to use when it comes to preschoolers which also resulted in a larger percentage preferring tablets to laptops and PCs. Although a large number of preschoolers still prefer video games, this shows the trend towards touch technology for this age group due to its intuitive interface. 70% of preschoolers preferred interactive media to traditional toys. This makes it important to target preschoolers with serious content suitable for their age. As the favorite media activity for preschoolers were found to be games, the design of educational games for this age should be an important focus of research. As for design preferences of preschoolers, cartoon characters and songs were found to be most appealing. Here comes the role of studying the popular culture for this target group to be able to choose familiar multimedia elements to integrate into the applications.

B. TV and Popular Culture

Although Television in Egypt is not interactive yet, TV viewing trends are vital to understanding the Arab children popular culture and its effect on their media taste and preferences. As the results of section IV-A2f showed, the top four channels watched by Egyptian preschool children are MBC3, Baraem, Toyoor-Aljanah and Space Toon. The four channels broadcast in Arabic, but sadly none of them is produced in Egypt or specifically targets Egyptian children.

a) MBC3: MBC3 was launched in Dubai in 2005 by MBC Group and primarily offers American and English programs, some of which are dubbed into Arabic. Although the channel has also created its own shows where children interact via telephone, most content is not localized to suit the Arab culture. There are also some cartoons which are violent or inappropriate for preschoolers, in addition to the high dose of commercials. Its interactive website, mbc3.mbc.net, contains games from the original English shows.

b) Baraem: Baraem, which is a publicly funded Qatari-owned channel launched in 2009, is the first preschool Arabic edutainment television for preschoolers offering a range of original and localized programs specifically tailored for them through high-quality, joyful, simple and commercial-free content. Its Arabic name براعم, in English: rosebuds, is sometimes used in the Arabic language to positively refer to young children. On both channels, the language of all shows is formal Arabic. Although this is intended to teach children the language, preserve their cultural identity and suit all children in the Arab world alike, we hold the view that preschoolers may easily loose interest in cartoons that could very well suit their age just because it is difficult for them to understand formal Arabic. However, all in all, Baraem is an excellent example of content localization for children. The channel has an interactive website for preschoolers, baraem.tv, which has a lot of well-designed educational games. It also has recently created an iphone app, using characters from one of its original cartoons, which teaches preschoolers the Arabic Alphabet.

c) Toyoor Al-Jannah: Toyoor Al-jannah is a channel which is based on a band of Jordanian children and parents who perform entertaining musical video clips in Arabic which aim at teaching children important morals and Islamic values. This band sells its own media products and uses the channel for advertisement. The channel also has a website, toyoral-janah.tv, which is basically a fan page for the band.

d) Spacetoon: Spacetoon TV, established in Dubai in 1997, is a kids' cartoon channel which shows a wide range of cartoons and programs dubbed into Arabic with commercial breaks in-between.Space Toon also started producing its own Arabic educational cartoons dealing with Islamic themes. However, like MBC3, it also contains violent and inappropriate materials. The choice of 'Space Toon' as an English name for the Arabic channel reflects the hybrid nature of the content. Their website spacetoon.com offers different games and activities and has a dedicated iphone app.

C. Technology and Literacy Development

With more and more of learning taking place outside of the "official" educational system, it is difficult to analyze factors shaping the knowledge profile of the new generation. However, some hints point towards the vital role which technology plays in educating our children and affecting, among other skills, their early literacy development. It is surprising to see that a much higher percentage of preschoolers can sing the English Alphabet better than singing the Arabic Alphabet song. This might be attributed to the practice of some nurseries, but as the favorite website of preschoolers was found to be youtube and their favorite TV channel to be MBC3, this could also very well indicate the influence of media on their literacy development. Most survey participants also indicated they show their children English songs and video clips more frequently than Arabic ones. In addition, the huge gap in quality between the Arabic and English software in this regard which was reveiled by the evaluation study might have influence on preschoolers' preferences. This might be the reason why the survey also indicates parents prefer to choose English educational content over Arabic for their preschoolers.

As results of the survey indicate, a relatively high percentage of preschoolers of the survey sample attended a special Computer literacy course. It is interesting to note that it was a significantly larger percentage among parents and caregivers who chose to complete the English survey. The most popular and well-known Computer literacy courses for preschoolers in Egypt are those given by Technokids Egypt. Technokids' international technology projects were designed using fun

activities specifically for children, with special courses for each age group. They offer five courses for preschoolers, one of which is called "Technoletters" course and is designed to teach the English Alphabet using activites on the computer. This might be another indicator supporting the assumption that digital activities for preschoolers tends to support their early English literacy neglecting the Arabic language.

D. Localization of Software

The concept of localization can play an important role in protecting the culture diversity of the world in the digital age. In our case, when developing Arabic digital content, software localization may be an alternative which saves developers the time and effort to develop everything from scratch. According to [14], the localization process consists of several factors to ensure that ideally, users do not notice that such process has taken place.

- Multimedia elements should reflect the culture of the country.
- References should be to ones indigenous to the country wherever possible or appropriate.
- Developers should involve language experts and native teachers in the development of localized software.
- Testing needs to be done by country natives.
- Narrations need to be done by native speakers.

E. Software Piracy in Egypt

All Egyptian companies and individuals developing software for children with whom we have had contact agreed that software piracy in Egypt and the high cost of developing educational multimedia was a major obstacle in their success. This was confirmed by our survey results where parents would rather download pirated material from the internet than buy commercial CDs for their preschool children. The Arab world in general and Egypt in particular suffers from an inefficient institutional environment of Intellectual Property Right (IPR) protection which harms both foreign as well as Egyptian Software companies [15]. It hinders legitimate inventions and investments in the field of software [16]. Reducing piracy in Egypt would bring positive benefits to the Egyptian economy [17]. The results of [15] show that efficient enforcement of property rights does not only rely on legal enforcement authorities, as decreasing the prices of software plays a much bigger role. This makes us argue that we now have a good chance to utilize mobile technology where applications are much cheaper (see Table I) which can be a very good starting point to combating piracy and encouraging high-quality authentic production for children.

VI. Recommendations

- Parents need to become more aware of the importance of early Arabic literacy skills development in the preservation of cultural identity.
- Arab developers, publishers and national agencies should play a role in tackling the need for more and higher quality indigenous digital content, especially in the education sector.
- Interactive Multimedia created for young Arab children should be based on international as well as local research to ensure high quality, age appropriateness and fostering of cultural identity.
- Multinational educational software developing companies who wish to sell their products in Arab countries should involve language and curriculum experts, teachers and national ICT agencies from the countries in the development of localized software early-on.
- More grant-funded initiatives and sustainable public-private partnerships in education are needed to expand the range and quality of Arabic software and digital content.
- Obstacles like software piracy which hinder the development of authentic commercial products should be addressed to encourage private companies to invest in high-quality projects. Funding to lower prices of local products and awareness campaigns to inform parents about the consequences of copyright infringement on the quality of products targeting their children may be effective in this regard. Utilizing mobile technology to produce applications with low prices may also play a vital role here.

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