

# Introducing a Mobile App to Increase Cybersecurity Awareness in MENA

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**Abstract**— Cybersecurity experts predict that cybersecurity is going to be the new cold war. Arab countries are exposed to cyber-attacks that are aimed at stealing personal data and trade secrets. Furthermore, statistics show that women in such countries are exposed to different forms of cyber violence. This paper introduces a new mobile app in the Arabic language to educate Arab-speaking people in the Middle East and North Africa (MENA) about cybersecurity and to increase their awareness of information assurance and cybercrimes. The app was developed for Android and iOS devices and it includes multiple-choice information assurance questions, terms, and articles. Examples of the term definitions are Two-Factor Authentication, Ethical Hacking, and Honeypot. The app data could be increased in the next update of the app.

**Keywords**— cybersecurity, mobile app, educational app.

## I. INTRODUCTION

Top cybersecurity industry companies, thought leaders, executives and journalists predict that cybersecurity is going to be the new cold war [1]. They further state that the new cold war is taking place online and the ongoing trade war between the U.S. and China is a clear sign. Cyber-attacks will increasingly be used between smaller countries as a proxy war by larger nations to extend their influence, as seen in the cyber operations against Iran in 2019, following attacks on Saudi Arabia's oil facilities [1], [2]. At the individual level, people have become clearly accustomed to the daily use of social media. As many of these people fall victim to cyber-attacks, more awareness about cybersecurity is needed to protect their social media, bank, and email accounts. Furthermore, people are interacting with their mobile devices more than anything else and the best way to reach people is through a mobile app.

There are more than 300 million Arabic speakers around the world, making it the fifth most-spoken

language globally behind Mandarin, Spanish, English and Hindi [3]. Gulf countries such as Saudi Arabia and the United Arab Emirates are increasingly becoming the targets of sophisticated cyberattacks that are aimed at stealing personal data and, in some cases, exposing state and trade secrets [8], [9].

Moreover, Middle Eastern societies are more conservative towards women's privacy as compared to other societies. Hence, hacking a women's online account and stealing their private pictures or information is more critical in those countries. A recent report released by the UN Broadband Commission states that 75 percent of women online had been exposed to some form of cyber violence. [17]. Online abuse of women includes hate speech, hacking, identity theft, and online stalking, and can also extend to human trafficking [9]. This underscores the need for a mobile app that is localized in the Arabic language to educate these people about cybersecurity.

The "Eight Golden Rules of Interface Design" and ADDIE model were revised before developing the app [18], [19]. The Interface design rules include: strive for consistency, seek universal usability, offer informative feedback, design dialogs to yield closure, prevent errors, permit easy reversal of actions, keep users in control, and Reduce Short-Term Memory Load[18]. The ADDIE instructional design process stands for: Analyze, Design, Develop, Implement, and Evaluate. The Analyze phase includes searching if similar product already exists. After searching Google Play, we were able to find several apps in the English language that publish the latest news of the cyber-attacks, such as the "Cyber Threat News" and the "Cyber Security News" apps [6], [7]. Additionally, we found the "Cyber Threat Protector" tabletop card game that aims to improve the nation's cybersecurity culture through a fun game for elementary students [4].

Seaborn and Fel found that applying gamification in any educational context contributes to increasing

the student's engagement in learning while providing feedback from such learning [10]. Muntean discusses the use of gamification techniques in the context of e-learning and the study found that the student's engagement increases in a gamified environment [20].

In the analyze phase, we also found one Arabic app in Google Play that tries to educate people about programming in general and it also includes some cybersecurity articles [5]. Also, it doesn't include gamification elements that could increase users' interest and engagement. We could not find an Arabic app that raises the Arab-speaking people's awareness about cybersecurity as we described.

This paper introduces a new mobile app to inform Arab-speaking people about cybersecurity and information assurance to increase their awareness of this important topic in an interesting and engaging way by including some gamification elements.

## II. THE APP DATA

The app includes three sections: multiple choice questions, term definitions, and articles. The questions section covers different situations that a user needs to respond to while being online. Such as what to do when receiving a link from your manager, how to respond when you see a warning dialog box asking you to click a button while browsing a website, when you need to be suspicious about some online activities, how to be aware of social engineering, what is Ransomware, what situation is considered to be phishing from different choices, and what is the difference between http and https. A good number of the questions were translated to Arabic from the "Quizizz" learning platform [12], [13].

The terms section includes definitions of some common cybersecurity terms, such as Ethical Hacking, Social Engineering, Two-Factor Authentication, Honeypot, Firewall, Worm, Virus, and Botnet. The terms and the articles sections' data were collected from different technical websites such as Kaspersky Middle East and The Arabic News Gate for Information Technology [14], [15].

The article section educates users about different security topics and to increase their awareness about different situations, such as how to create strong passwords, or how to delete the saved ones from their computers, how to deal with two factor authentication, what is biometric authentication, what is phishing emails, what are DDoS attacks, and what are the different ways that hackers could use to steal your bank account while shopping online.

## III. THE APP DESCRIPTION

The app was developed on both the Android and iOS platforms. It has already been published on

Google Play and is expected to be on the App Store soon after publishing this article. The app link for the Android version can be found in the reference list of this paper [16]. Fig. 1 shows the app's first and second views.



Fig. 1: The Start and About Views.

The app included multiple choice questions and when a user answers correctly his/her scores will increase. The scores are also increased when the user reads an article or a term definition. Adding this gamification element could increase the user engagement and their motivation to learn, as Seaborn and Fels stated [10].

The following sections will describe some of the functional and technical features of this app, mostly in the Android version, as the iOS version is quite similar in terms of its functionality. The reader is encouraged to download either one that complies with their Smartphone. The App has two side menus and six views as described in the following sections. Each view has its Java class and XML user interface file. In Android mobile development each view could be created through different kinds of activities [11].

In this app, two types of activities were used: Empty Activity and Navigation Drawer Activity. Different kinds of Widgets were used such as webView, Buttons, TextView, ImageView, ListView, and Radio Buttons [11].

### A. The About and the Start Views

As shown in Fig. 1, the Start View has the app name, the app icon, the title bar, and the start button. This view explains the app goals in a short paragraph. After a user clicks the start button, the next view appears with two menus at the top, the sandwich menu and the option menu. The option menu has the About option that takes the user into the About View.

### B. The Question View

The next view is the Question view where a user needs to answer multiple choice questions to collect scores. This view is the main view of the app with

two menu icons at the top. Fig. 2 shows this view and the side menu.



Fig. 2: The Question View and the side menu

The scores are increased by 10 with each right answer and decreased by 10 with each wrong answer. An encouragement message is displayed shortly with each right answer. When a user answers a question, the answer button is disabled to allow one answer. However, a user can revisit the same question and answer it using the previous and the next buttons.

The answers options are shuffled with each visit and the questions are shuffled each time the user opens the app. An array of the correct questions was used to make sure that the scores were increased once in case the user tried to answer the same question multiple times.

### C. The Cybersecurity Terms View

This view has a list of cybersecurity common terms and when a user clicks on any item, the term definition is displayed in a new view called Term Details View with the back button to the term list. The term list and the term details view are shown in Fig. 3.



Fig. 3: Term List and Term Details view.

The side menu is in the Question View; going back from the Details View to the main or Question View requires some code to make sure that the term list is displayed and both the questions and article list are hidden. When a list item is clicked, the `startActivityResult()` method is called instead of `startActivity()` to display the Term Details View. This method requires adding an extra method to the Question View. This method is called `onActivityResult` and it is shown in Fig. 4. The scores are increased by five whenever the user clicks on any term item.

```
protected void onActivityResult(int requestCode, int resultCode, Intent data) {
    super.onActivityResult(requestCode, resultCode, data);
    if (requestCode == 123) {
        if (resultCode == Activity.RESULT_OK) {
            comingFromDetails = data.getBooleanExtra(
                "ComingFromDetails", defaultvalue: false);
        }
        if (resultCode == Activity.RESULT_CANCELED) {
        }
    }
    if (requestCode == 321) {
        if (resultCode == Activity.RESULT_OK) {
            comingFromArtDetails = data.getBooleanExtra(
                "ComingFromArtDetails", defaultvalue: false);
        }
        if (resultCode == Activity.RESULT_CANCELED) {
        }
    }
}
//onActivityResult
```

Fig. 4: An Android Java method in the Question View.

### D. The Article View

The app also includes an article list which has 30 cybersecurity articles from different technical websites. Fig. 5 shows the article list and the webView activity.



Fig. 5: Article List and Article Details View

When a user clicks on any article, a webView activity will be displayed with the targeted website and a back button to return to the article list. The `onActivityResult` method was updated to handle showing the article list when the back button is clicked, similar to the term list.

## IV. Summary

This paper introduces a new educational app that educates people about cybersecurity and information

assurance. The app will be available at Google Play for Android devices and later on the App Store for iOS devices. In this paper, the Android version is discussed in detail as the iOS version will be similar to it. The first version of this app includes 20 multiple choice questions, 15 terms, and 30 articles. This data will be increased to cover more topics in the next update. The app will need to be tested on people. The suggested future research is to measure a sample understanding before and after using the app.

The app in this paper was mainly designed for adults; however, it is also child-friendly. Nevertheless, the researchers of this paper recommend designing a fun game educational app for elementary students to teach essential cybersecurity information and strategies in the Arabic language. This app would help kids understand the importance of cybersecurity in their everyday lives.

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