# The Attitude toward the Implementation of Interactive Applications (IAs) in Kuwaiti Academic Libraries: College of Medicine Library as a Model

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**Abstract:** *This study seeks to investigate the attitude and awareness toward the implementation of Interactive Applications (IAs) in the College of Medicine Library (CML) at Kuwait University (KU), as well as to explore the perspective of this technology use among medical collages` students and faculty members. It adopted a quantitative method by using a questionnaire to collect data from students and faculty members from four medical colleges in KU, which were the College of Public Health, College of Pharmacy, College of Medicine, and College of Dentistry. The main findings indicated that IAs are important to the participants and to their medical field, however, they are still not aware towards IAs usage in CML and they are not ready to use it. Furthermore, the results revealed that there are several challenges which hinder the use of IAs in CML at KU such as there are no workshops towards IAs in medical fields, financial issues, network maintenance, and lack of awareness and attitude toward IAs usage. This study should be an eye - opener for both the researcher and the practitioners that the IAs are still lacking in the medical colleges at Kuwait University, despite the increasing needs from the faculty members and students. Limitations in this study are related with the ability of the findings to be generalised to other students in different majors. More research needs to be conducted on the usefulness of Interactive Application technologies in HEI's libraries.*

**Keywords:** Interactive Applications, Augmented Reality, Virtual Reality, Mixed Reality, Academic libraries, State of Kuwait.

## 1. Introduction

Interactive Applications (IAs) are becoming lot more common and is more integrated into our everyday activities, like playing mobile apps, watching sport or using social media. People who have used a Snapchat lens, played Pokemon Go, or watched football game on television has already experienced such applications. Presentation tools of academic content are increasing in popularity for educators in higher education institutions (HEI) who want to share ideas and information in a more creative and interactive environment using more effective tools and demand to involve their students in learning using technology, while, on other hand, the challenges for libraries and librarians are growing to provide the required support to improve the educational systems in HEI as information systems and technologies evolve. This study discusses the prospective of new innovative technologies to bridge the gap between traditional learning practices and desired research and learning practices. Hence, the main goal of this paper is to find a more efficient and effective way to share the content of information resources in academic libraries, which would conceptualize the educational system to maximize its outcome through an interactive learning content.

The use of e - books has made a huge leap in the traditional ways of education in the higher education institutions (HEIs), however since its beginnings in the 1960s, there have been no significant developments until the features of the Fourth Industrial Revolution (4IR) began to emerge through Interactive Applications (IA) such as the applications of Augmented Reality (AR), Virtual Reality (VR), Mixed Reality (MR) and Holography (Humphreys, 2020).

In an increasingly technologically aware age, organisations such as libraries and information services need to be confident of the benefits of technology adoption and look to take forward the knowledge gained. The ability of IAs to enhance what already exists is what makes it an ideal fit for libraries, educational institutions, museums and similar institutions. It can be used for resources way finding, shelf - reading, upgrade services, technological integration, and community engagement. New technology services are making it easier than ever for libraries to create their own free or low - cost IAs content without having to download a Software Development Kit (SDK) or transact with complicated Application Programming Interface (API) codes (Blokdyk, 2017). Therefore, this study seeks to investigate the attitude and awareness toward the implementation of IAs in MCL at KU, as well as explore the nature of these technology uses among medical collages` students and faculty members.

## 2. Literature Review

**The Concept of Interactive Applications (IAs)**
An Interactive Apps (IAs) is an application that allows users to interact with audio - visual information via gamification, visualization, and even Virtual Reality (VR), Augmented

Reality (AR) and Mixed Reality (MR). The origin of Interactive Applications such as AR, VR came way back in 1838, when Charles Wheatstone invented the stereoscope (Root, 2015). Figure 1 shows the timeline of Interactive Applications by checking out this infographic, which details not only the technology's past but also its present and future (Ghuloum and Allamki, 2021).
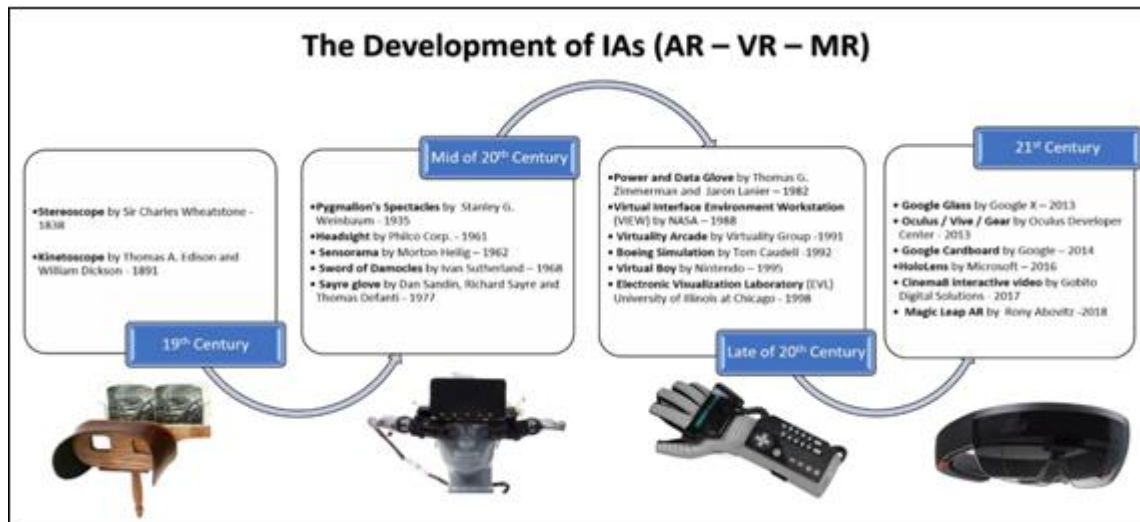


**Figure 1:** The Development of Interactive Applications (AR - VR - MR) (Ghuloum&Allamki, 2021)

**Augmented Reality (AR)**
Augmented reality can be defined as "an enhanced version of the real physical world that is achieved through the use of digital visual elements, sound, or other sensory stimuli delivered via technology" (Butterfield, Ngondi and Kerr, 2016). Furthermore, AR is a system that fulfils three basic features: a combination of real and virtual worlds, real - time interaction, and accurate 3D registration of virtual and real objects (see Figure 2).
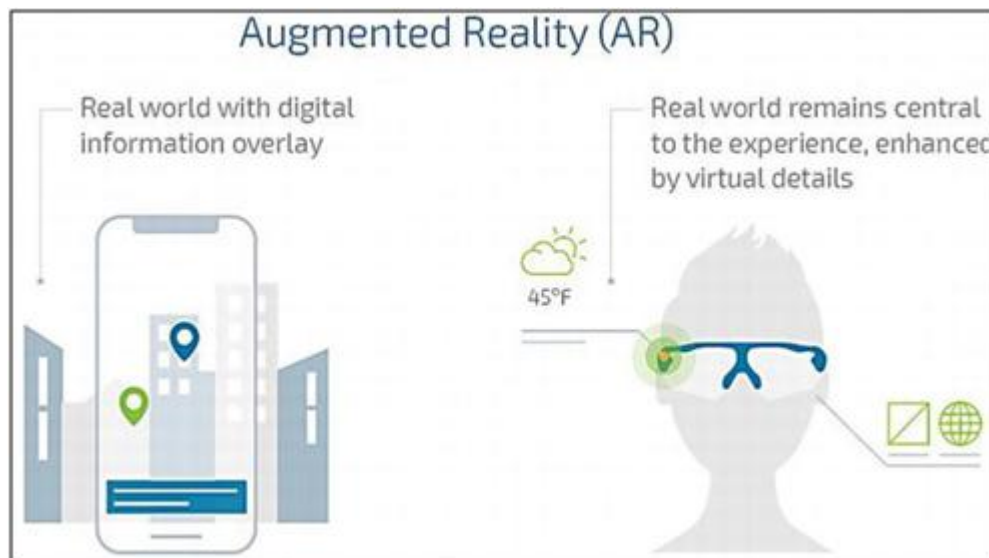


**Figure 2:** The concept of augmented reality (Jung, Dieck and Rauschnabel, 2020)

**Virtual Reality (VR)**
Virtual reality is one of the most popular technologies currently, which can allow experiencing things that may be difficult to happen in the real world. VR can be defined as "an artificial environment that is created with software and presented to the user in such a way that the user suspends belief and accepts it as a real environment" (Butterfield, Ngondi and Kerr, 2016). Furthermore, it is the computer - generated simulation of a three - dimensional image or environment that can be interacted with in a seemingly real or physical way by a person using special electronic equipment, such as a helmet with a screen inside or gloves fitted with sensors (see Figure 3).
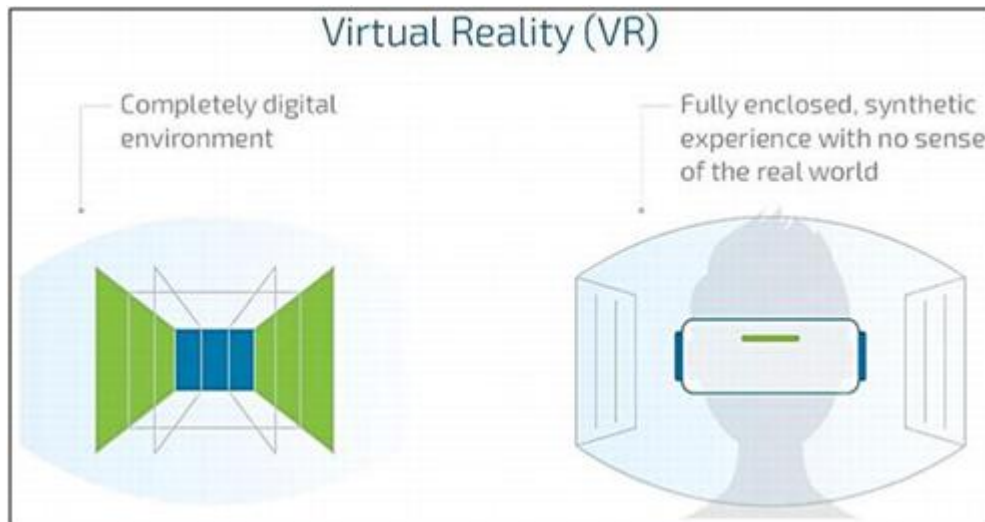
**Figure 3:** The concept of virtual reality (Jung, Dieck and Rauschnabel, 2020)

**Mixed Reality (MR)**

Mixed Reality, also called the merged reality, is a term coined by technology giants Intel and Microsoft to describe their proprietary VR project. MR is defined as "the merging of real and virtual worlds to produce new environments and visualizations where physical and digital objects co - exist and interact in real - time" (Speicher, Hall and Nebeling, 2019). Figure 4 indicates MR takes place not only in the physical world or the virtual world but is a mix of reality and virtual reality. Simply, MR is a hybrid of VR and AR and aims to offer the best of both worlds. For instance, while it uses a headset just like VR, seeing through a translucent viewport or glass, it also projects visuals on top of our environment.
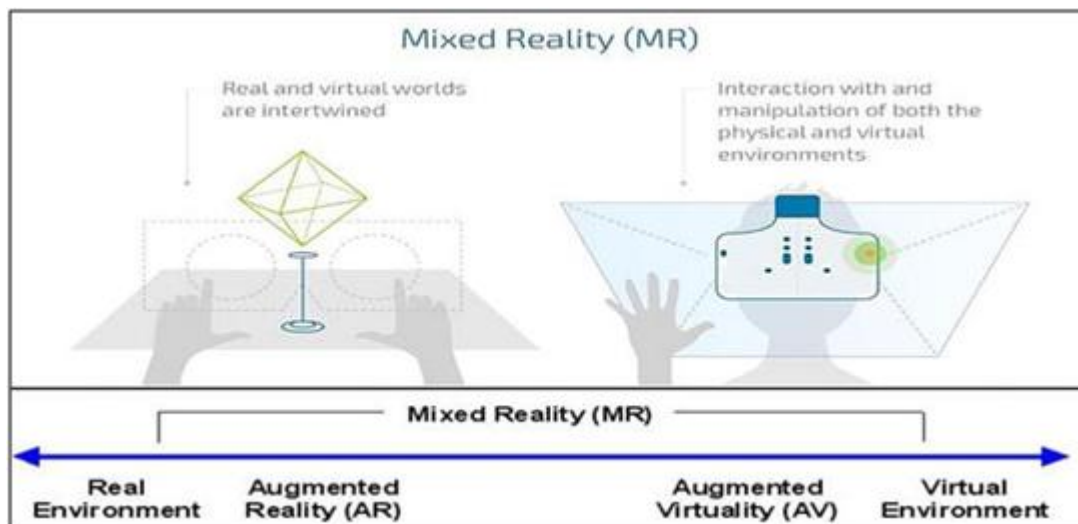


**Figure 4:** The concept of mixed reality (Jung, Dieck and Rauschnabel, 2020)

**Interactive Applications (IAs) in Academic Libraries in the Digital Era:**

Forty years and more the future of the library has been questioned by people, in addition it has been predicted by some the end of the library. This is due to being incapable to deal with the digital and social transformation, unsustainable by the classic Gutenberg era; having made a dead end, they "may disappear like the dinosaurs" (Thompson, 1983). But one thing is for sure, which is the development of the modern world of information technologies and digital developments, connectivity has changed the future advancement of libraries, and libraries must offer advanced solutions if they want to exist. Integrating IAs, such as VR, AR, and MR into higher education institutions and their libraries, are essential to the advancement of learning in the digital age. Advanced learning platforms through technology are already available and in higher education, their use is catching on. In fact, the use of IAs is already becoming more popular in higher education. Since 2015, for instance, first - year medical students at Case Western Reserve University have been learning from home using an MR app called HoloLens and Holo - Anatomy, created by Case Western Reserve University and Cleveland Clinic in cooperation with Microsoft. Through 3D learning, medical students are learning about the human body in a way that would otherwise not be possible (Ma., Fallavollita and Seelbach, 2016). Similarly, San Diego State University Instructional Technology Services has used virtual immersive teaching and learning since 2017. Students' learning is enhanced through the opportunity to interact with 3D graphics in what appears to be a real - world environment. Instead of placing the student or a camera within a physical learning environment, virtual reality places the student in a simulated

environment where senses such as vision, hearing, and touch foster learning.

In 2015, the University of North Texas (UNT) Media Library began offering access to VR and AR devices. This collection is growing as new technology, games, and devices evolve to support students, faculty, and staff interested in research and recreation. IA's in UNT Media Library can be used for various forms of simulations and entertainment, for instance, by using VR headsets such as HTC Vive to let students walk around 3D visualizations or reconstructions of archaeological sites. Moreover, museum visits, view artwork from different angles or up close, or view designs in 3D and gain a better understanding of how they work (University of North Texas, 2020).

Two years later, in 2017, Harvard University Library opened the AR/VR studio to further the growth of the ventures being built at Harvard using inspiring AR, MR, and VR tech, as well as, to give students from across the university a space to experiment with and create projects and ventures in the virtual, augmented, and mixed reality spaces (Goldstein, 2017). In the same year, North Carolina State University (NCSU) Libraries launched the Virtual Immersive Teaching and Learning (VITaL) initiative, providing a variety of VR, AR, MR, and 360° - video immersive tools for use across the NCSU pedagogical spectrum. Today, "VITaL serves as an incubator to enable experiences that would be out of reach, if not impossible in a traditional learning environment, including low - frequency, high - risk scenarios simulating life - threatening medical conditions, celestial events in outer space, and scientific phenomena occurring at the micro scale" (Hauze, 2019). Thus, there are many university libraries around the word have used these technologies to enhance their services and functions. Hence, information resources development is no longer restricted and residing within the realm of speculative fiction. By using IAs academic libraries and learning centres could already deliver a massive revolution in information retrieval.

However, according to Rotolo, Hicks, & Martin, (2015) the biggest challenge that needs to be tackled perhaps remains in how we could tune between these resources and the users so that the greatest possible benefit could be achieved in the light of accelerated technological development. Given the perceived lack of available research material regarding the impact of emerging technologies in real - life application since they are new and still developing. This development of information resources leads the researchers to introduce a new term titled Interactive Information Resources (IIR).

**The Concept of Interactive Information Resources (IIR)**
Ghuloum, Allamki, and Alhabashi, during the Digital Transformation Conference in the State of Kuwait in 2018, presented a new concept of IIR which is;

"*a type of electronic resource that is faster and more flexible in information retrieval than both the traditional and the electronic information resources due to the wearable form - devices and its complex algorithms. It is used to instantly map your information environment to create photorealistic, shareable, and collaborative 3 - D digital models of the contents*" (Ghuloum., Allamki and Alhabshi, 2018, p.3).

The wearable devices and software incorporate digital and holographic data into the real - physical environment and streamline existing use of the information resources processes in a collaborative context to enhance and empower the experience of the beneficiaries. In other words, it is a way to simulate the content of traditional resources into an augmented electronic environment, where the new shape of the content could be interactively browsed using the physical hand - waving of users. Information resources, over the time has gone through many changes, starting with Traditional Information Resources (TIR), then Electronic Information Resources (EIR), and finally Interactive Information Resources (IIR). Table (1) clarifies the comparison criteria between the different types of information resources.

**Table 1:** Comparison IR criteria between TIR, EIR and IIR (Ghuloum., Allamki and Alhabshi, 2018)

| Information Resources (IR) Criteria | Traditional Information Resources (TIR) | Electronic Information Resources (EIR) | Interactive Information Resources (IIR) |
|---|---|---|---|
| Multimedia | Static | Dynamic | Interactive |
| Browsing Speed | Slow | Fast | Instant |
| Collaboration | Not Supported | Not Supported | Supported |
| Content | Printed | Electronic | Photorealistic |
| Sharing | Not Possible | Possible | Possible |
| Accessibility | During working hours. | 24 - Jul | 24 - Jul |
| Update | Slow / Easy | Fast / Easy | Fast / Hard |
| Space | Require large physical space | Require reasonable electronic storage | Require large electronic storage |
| Information Literacy | Knowledgeable | Widely knowledgeable | Lack of knowledge |
| Cost | Reasonable | Reasonable – Expensive | Very Expensive |
| Maintenance | Low | Medium | High |

**Challenges and Opportunities of IAs in Academic Libraries:**
To implement a new technology in academic libraries such as IAs, we need to understand the strength and weakness aspects in this type of technology. There are barriers that affect using IAs in academic libraries such as security and privacy, network issues, substantial time commitment, lack of 3D design interface, user acceptance, high cost, motion sickness. On the other hand, there are opportunities; enhance library services, support teaching information literacy, effective platform for the 21st century, encourage active learning, and attractive platform for users (see figure 5).

**Figure 5:** IAs Challenges &Opportunities in Academic Libraries (Ghuloum and Allamki, 2021)

**Research Methodology**

The study adapted a quantitative method by using a questionnaire to explore the respondents' perception and attitudes towards the implementation of AIs in KALin order to collect data from students and faculty members from the College of Medicine Library in Kuwait University (KU). The quantitative method has been chosen because of the significant amount of data and feedback it provides, in addition to easy access to the participants, and the low cost involved. Yin (2009) confirmed that, the definition of the research questions is one of the most important steps to be taken when designing a study. Hence, the study questions are linked directly with the aim of the study, which are:

1) What are the IAs applied in academic libraries?
2) What is the level of awareness of IAs among students and faculty members in KAL?
3) What is the Attitude of students and faculty members towards IAs in KAL?
4) What are the main challenges, if any, that may hinder implementing IAs for KAL?

The study was carried out during the winter of 2021, the number of students and faculty members registered in medical faculties at KU was 2524 (table 1). A questionnaire was used to obtain a descriptive overview of the respondents' perceptions from students and faculty members from the College of Medicine Library in Kuwait University (KU). An online questionnaire was sent to10% = 252 of the total number of students and faculty members in Medical Collages at Kuwait University, however, out of 252 questionnaires, 211 were returned with an 84.4% return rate (table 2).

**Table 2:** All Students and Faculty Members at Medical Collages in KU

| Medical Collages at Kuwait University | | Number of Students | Number of Faculty Members | Total |
|---|---|---|---|---|
| Collage of Public Health | Count | 965 | 58 | 1023 |
| | % of Total | 94.30% | 5.70% | 100% |
| Collage of Pharmacy | Count | 279 | 33 | 312 |
| | % of Total | 89.40% | 10.60% | 100% |
| Collage of Medicine | Count | 770 | 197 | 967 |
| | % of Total | 79.60% | 20.40% | 100% |
| Collage of Dentistry | Count | 178 | 44 | 222 |
| | % of Total | 80.20% | 19.80% | 100% |
| *TOTAL* | Count | 2192 | 332 | 2524 |
| | % of Total | 86.80% | 13.20% | 100% |

**Table 3:** Participants` profiles

| Medical Collages at Kuwait University | | Number of Students | | Number of Faculty Members | | |
|---|---|---|---|---|---|---|
| | | Male | Female | Male | Female | Total |
| Collage of Health Science | Count | 22 | 26 | 6 | 9 | 63 |
| | % of Total | 45.80% | 54.20% | 40% | 60% | 100% |
| Collage of Pharmacy | Count | 13 | 19 | 5 | 7 | 44 |
| | % of Total | 40.60% | 59.40% | 41.70% | 58.30% | 100% |
| Collage of Medicine | Count | 29 | 14 | 8 | 12 | 63 |
| | % of Total | 67.40% | 32.60% | 40% | 60% | 100% |
| Collage of Dentistry | Count | 13 | 15 | 6 | 8 | 42 |
| | % of Total | 48.30% | 51.70% | 46.20% | 53.80% | 100% |

| | | | | | | |
|---|---|---|---|---|---|---|
| *TOTAL* | Count | 77 | 74 | 25 | 36 | 212 |
| | % of Total | 51.30% | 48.70% | 41.70% | 58.30% | 100% |

The statements in the questionnaire were established from the literature concerning IAs and academic libraries. The questionnaire was divided into four main sections. The first section elicits demographic information, while the second section deals with the level of awareness of IAs among the participants in KUL. The third section explores the attitude of participants towards IAs in KUL. Finally, the last section identifies the challenges that may hinder implementing IAs for KAL. All sections were divided into 7 points using a 3 - point Likert Scale (Agree - Don't know - Disagree); one final open - ended question was added for comments and suggestions.

### Section I: Demographic profile:
This part of the questionnaire ought to identify the participants` profiles to give a clear image of the percentages of this profile before presenting the other results. Figure 6 show that out of 212 participants, 111 (52.4%) were female while 101 (47.6%) were male.
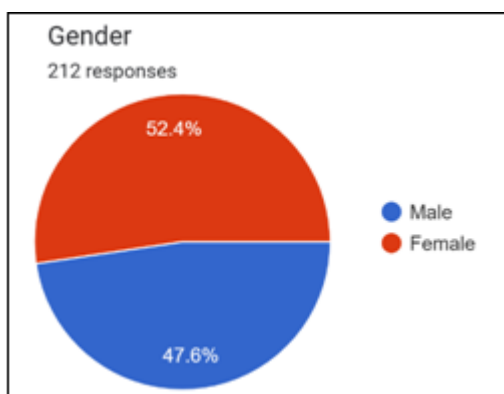


**Figure 6:** The gender of participants

Regarding the participants' title, out of 212, 151 (71.2%) were students, while 61 (28.8%) were faculty members (Figure 7)
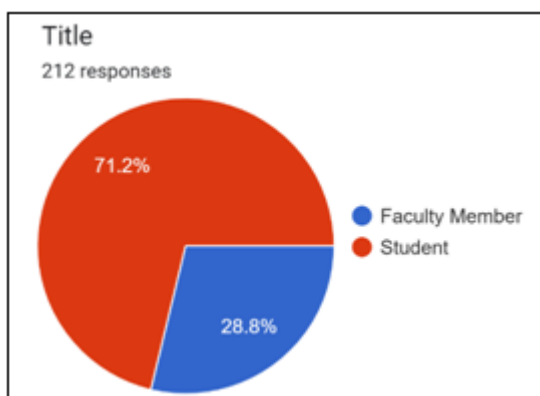


**Figure 7:** The title of participants

Figure 8 identifies the number of participants distributed over four medical collages at Kuwait university. The percentages were almost close: Collage of Health Science and Collage of Medicine were at the same percentage 63 (29.7%) while 15 (15%) were from Collage of Pharmacy, and 42 (19.8%) from Collage of Dentistry.
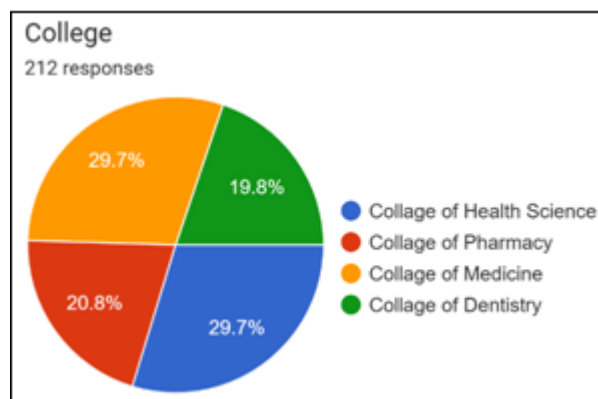


**Figure 8:** Number of respondents distributed over educational medical colleges at KU.

### Section II: The Level of IAs Awareness
This part of the questionnaire sought to collect findings on the awareness of participants toward IAs. Figure 9 showed that out of 212 participants, 114 (53.8%) had heard of IAs, while 80 (46.2%) had not. The results also show that out of 63 participants from College of Health Science 34 of them had heard of IAs, while 29 had not. In the same vein, 32 participants from College of Medicine had heard, while 31 had not. However, 23 of respondents at Collage of Pharmacy had not heard about IAs, while 21 of them had heard. Finally, out of 45 participants in the College of Pharmacy, 29 of them had heard about IAs while 16 of participants had not. These results indicate that, more than half of all respondents had heard about the IAs.
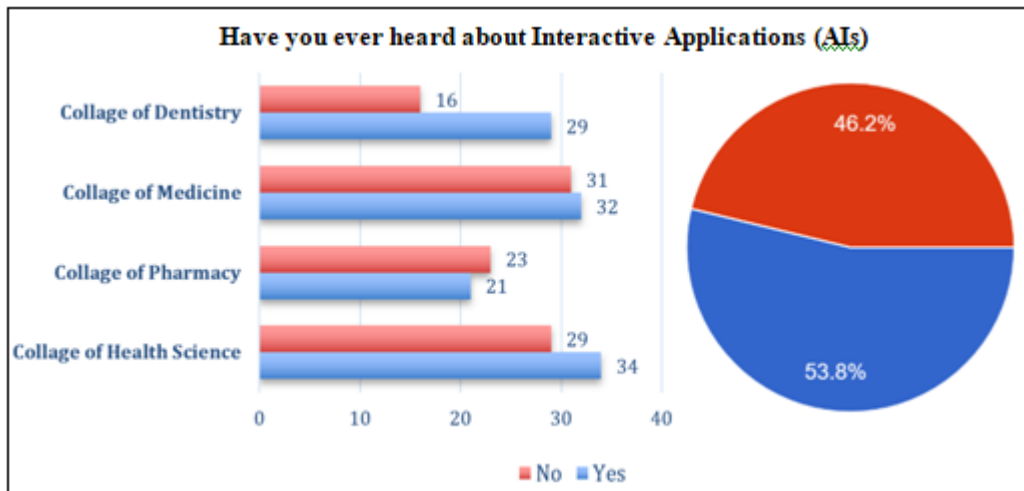
Paper ID: SR23207223541                    DOI: 10.21275/SR23207223541                    540

**Figure 9:** Have you ever heard about Interactive Applications (AIs) such as (VR, AR, MR)

Figure 10 indicates the level of awareness IAs, out of 212 participants 170 (80.2%) agreed that "IAs is important to me". Moreover, 129 (61%) confirmed that "IAs helps me to prepare my work more efficiently compared to conventional methods". In the same vein, 123 (58%) admitted that "IAs resources contribute to understand the subject more than other sources (paper sources/ E - sources) ". On another hand, most of participants (147= 69.3%) were not aware about IAs usage, while 64 (30.7%) of them agreed they aware. In addition, 96 (45.3%) of participants disagreed with that "IAs like (VR - AR - MR) is easy to use", while 47 (22.2%) of them said don't know and 69 (32.5%) confirmed that IAsis easy to use. The results indicate that participants agreed that IAs is important to them and to their work, however, they are still not aware towards IAs usage and most of them confirm it is not easy to use.
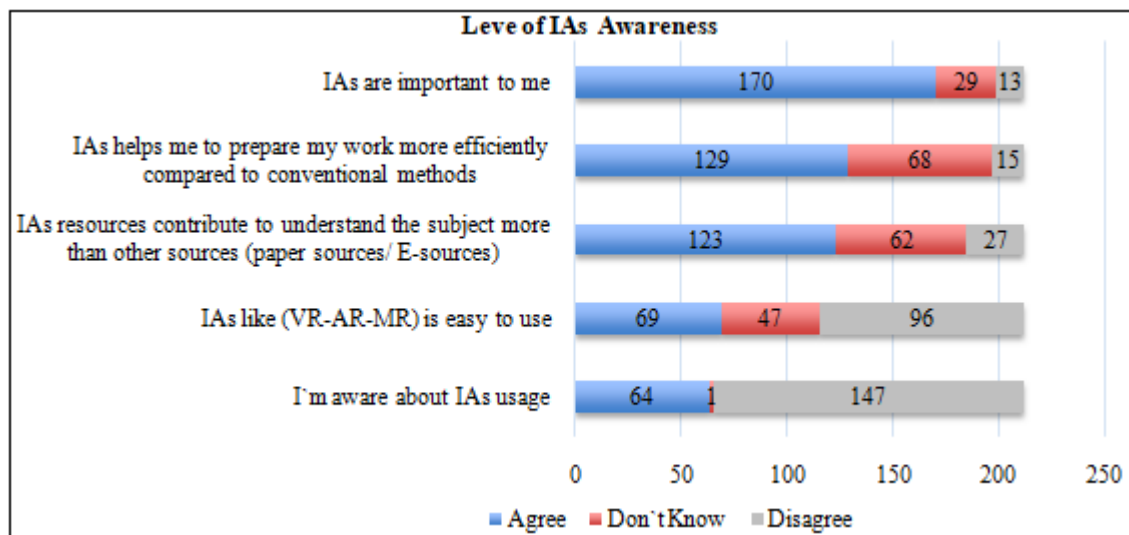


**Figure 10:** The level of IAs awareness

**Section III: The Attitude of IAs:**
Regarding the participants` attitude toward IAs, most of them (180 = 85%) were happy to learn about IAs in depth. Furthermore, 156 (73.6%) of respondents agreed that "IAs support the medical curriculum", in the same vein, 143 (67.5%) confirmed that "IAs develop more understandings in medical field". However, out of 212 participant, 140 (66%) they don't have the skills to deal with IAs. Moreover, 128 (60.4%) of them were not ready to use the IAs related to my field, while 69 (32.5%) confirmed they are ready (figure 11).

The findings revealed that, the respondents from medical collages at KU still not attitude and not ready to use IAs at CML even if they confirm it is important in their medical field.
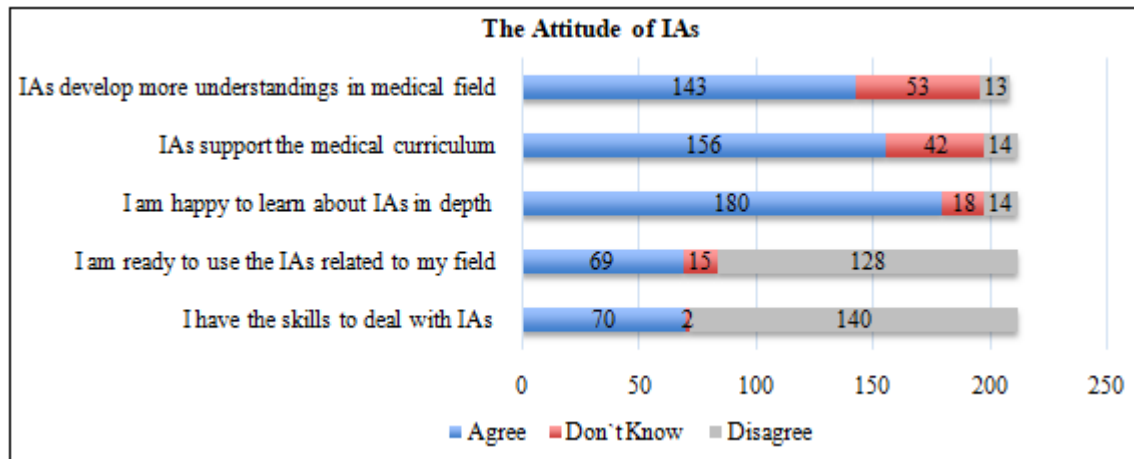
**Figure 11:** The attitude of IAs

**Section IIII: The Challenges of IAs:**

Regarding the challenges of IAs, most respondents (185 = 87.3%) confirmed that "The library should make more effort to spread awareness of IAs usage". In the same vein, 150 (70.8%) agreed that "Financial Issue is an IAs challenge", while 59 (27.8%) they said "don't know" and only three participants disagree with that. Moreover, 134 (63.2%) of participants agreed that "the library faces a network maintenance problem", while 56 (26.4%) they said "don't know" and 22 (10.4%) of them disagree with that. In addition, 88 (41.5%) of respondents confirmed that they are ready to use IAs in my field without hesitation, however, 77 (36.3%) of them didn't ready and 47 (22.2%) they don't know (Figure 12).

The results confirmed that, there are several challenges which hinder the use of IAs at CML such as there is not enough workshops towards IAs in medical fields, financial issues, the network maintenance and lack of awareness and attitude toward IAs usage.
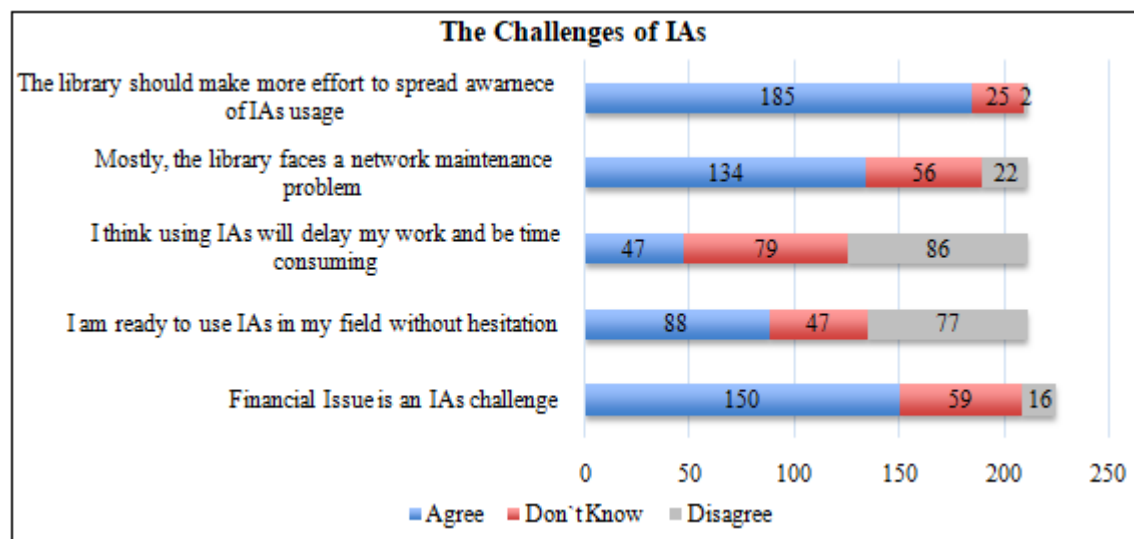


**Figure 12:** The challenges of IAs

## 3. Conclusion & Recommendation

Academic libraries should maintain up-to-date technological trends in a dynamic environment and enhance the awareness of the importance of continuing innovation development and growth in their critical reflection and creative thinking skills. Today, many universities, especially in medical colleges, have sensed the importance of IAs and have begun to implement it in their libraries. For instance, IAs give students and faculty members access to advanced ways of visualising human anatomy that are vastly superior to traditional cadaver and book - based anatomy lessons. Despite the importance of IAs in the medical field in academic environment, students and faculty members at KU are not aware of IAs usage at CML. Furthermore, there are several barriers that hinder to implement IAs in CML at KU such as lack of training courses and workshops towards IAs in medical fields, lack of financial support, network maintenance problems and lack of awareness and attitude toward IAs usage.

The researchers present here recommendations for KU to promote the implementation of IAs in CML and to raise awareness and attitude of KU students and faculty members toward IAs usage:
- To implement IAs in KAL, it is important to modify the current situation by raising the level of financial support and increasing the annual budget for academic libraries by the authorities responsible.
- Authorities at KAL need to provide more training programs and workshops related to IAs such as VR, AR and MR that could enhance the awareness and attitude of

the academic community (students and faculty members) in using such advanced technology.

- Authorities at KAL must consider that IA devices and equipment need a periodic maintenance to remain in good condition throughout their useful life.
- Authorities at KAL need to establish a unit for IAs in CML tolet the students and faculty members practice this type of modern technology in an actual setting.

While the study has provided new data about the IAs in medical field at KAL, further aspects need to be considered in future research. The recommendations proposed in the study were designed for Kuwait, however they could be adopted under different scenarios: for example, different countries or/and other libraries.

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