

EDUCATION 2.0

CHRONICLES OF TECHNOLOGICAL AND CULTURAL CHANGE IN EGYPT

EDITED BY
LINDA HERRERA





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21. Building the Knowledge Bank from Scratch: Interview with Mohamed El-Araby

*Linda Herrera*¹

Abstract

Mohamed El-Araby, web developer and coordinator of the Egyptian Knowledge Bank (EKB), describes working with a team of engineers to build the platform from scratch. He explains its general architecture, and how they developed special features for teachers and students in Kindergarten through Grade 12. He manages the project's relationship with the publishers who provide the content, and the partnership with the national Center for Curriculum and Instructional Materials Development (CCIMD) to ensure educational materials are properly sorted to match specific subjects and lessons. During the COVID-19 pandemic when the country had to make a quick pivot to online learning, the EKB assumed the additional function of serving as the nation's learning management system which required around the clock solutions. As a perpetual work in progress, he stresses the importance of constantly improving the systems.

Keywords

digital library, distance learning, learning management system, private lessons, study guides

1 This interview took place on 7 May 2020 via Zoom. Thanks to members of the Education 2.0 Research and Documentation Project Nelly El Zayat and Nairy AbdElShafy for support with coordinating and preparing for this interview.

1. Building the Knowledge Bank Ecosystem

LH Can you introduce yourself and tell us about your role in the Egyptian Knowledge Bank (EKB)?

MA My name is Mohamed Hany El-Araby. I am a graduate of the Faculty of Science, Computer Science and Statistics, Helwan University. In 2007, I started working at LIMS Egypt with Mr. Mahmoud Hussein and Mr. Mahmoud Dawoud and I still work there now. When I started the job, my main role was as a web developer writing code, working with SQL Server,² and working on web developing applications for our clients, like WHO or EUL consortium. These clients were trying to make applications to help them with scientific research and help them support their users online and offline working from home. That was my main task during that time. We evolved by starting the projects for the Egyptian Knowledge Bank (EKB).

LH Just to clarify, LIMS is a private company, but the EKB is a government platform. Is that correct?

MA Yes, the EKB is a government platform. We provide the main coordination for the publishers working within the EKB.

LH When do you remember first hearing about the idea of a knowledge bank in Egypt and what was your reaction?

MA The idea started on World Science Day in 2014. At that time, it was a huge challenge for students and researchers to access content available online. They needed to leave their homes, go to a university or library, and physically see what subscriptions or archives were available. For example, people traveled from Asyut to Cairo just to get a research paper. With the EKB, a researcher with just a national ID, could login and access peer-reviewed, high-quality content from many prestigious publishers from all over the world. They could access a huge number of

2 SQL Server is a relational database management system (RDBMS) from Microsoft. For information on the Database Engine, Machine Learning Services (MLS), Integration Services (SSIS), Analysis Services (SSAS), Data Quality Service (DQS) and more, see the Microsoft Build information page at <https://learn.microsoft.com/en-us/sql/sql-server/what-is-sql-server?view=sql-server-ver16>

valuable papers, videos, images, Ph.D. dissertations, all for free, from home. Today, we can see the good results of this.

LH In 2014 when the idea for a Knowledge Bank was being discussed, did you think that from a technical standpoint it could be built?

MA What I believed was that this was going to be a very good breakthrough. It could provide a wealth of information at any time to all Egyptian users. We were very curious to see how it would go. We wondered how people would accept it and how they would start using it? This was the time when it was becoming more understood that there was a lot of misinformation on the Internet. Remember, this was after the 25 January 2011 Revolution and the Second Revolution of 2013. The idea of a digital library with reliable information from various reputable publishers, available everywhere for researchers and learners, was great. It is much better than just going to the Internet, searching for something, and using information that cannot be verified.

LH Did you have to start from scratch, or were there prototypes you were looking at? Where did you begin?

MA We really had to start from scratch. This was a new experience. No country had built a platform before that is free for the entire country. We knew our researchers were facing obstacles of time and access and we needed to develop a solution to help them. We were trying to build a national education platform for a huge, diverse population where people could follow their curiosity, access materials, and learn from them. We had to build a system that would allow them to find all the resources they needed very easily.

In the beginning, we worked a lot on the interface for registration and login and monitoring the workflow or usage of the system. We wanted to make it easy for users to just login, start searching, and use all the resources available. We also spent time on the search function. We had brainstorming sessions with all the technical people committed to the project to find the simplest way for users because we know that not everyone in the public community has good experience with computers. We were drawing on our previous experiences and the knowledge we gained from working with different stakeholders.

LH Who did you work with to develop the Knowledge Bank?

MA In the early stages, we were working with Dr. Tarek Shawki himself, Engineer Majed Al Sadek (see Chapter 20 in this volume), and for sure, the people of the National Information Network at the Egyptian Academy of Scientific Research and Technology (ASRT) and the Egyptian National Scientific and Technical Information Network (ENSTINET).³ These were the main people we were working with at that time.

2. Bringing Users to a New Platform

LH How did people relate to this Knowledge Bank in the first year or two? Was there anything that surprised you about the user base?

MA In these first years we were visiting universities to do trainings. We told people about how the EKB evolved and informed them that it is available to them for free and they can access it from anywhere at any time. The EKB was tailored to researchers, mainly in universities in the beginning. A huge number of people accessed the project because they really did not believe they could find quality resources and publishers available for free. The training part was mainly handled by my colleague Mr. Mahmoud Dawoud. What I can say is that before COVID-19, we were travelling everywhere across Egypt. We went from Aswan to Alexandria giving training sessions in schools and universities on the EKB. We continued trainings online after COVID-19 because we could not travel. A number of Egyptian researchers who had returned from studying abroad in Germany, the USA, or the UK, did not believe that

3 See the International Standard Serial Number International Centre for more information: 'The Egyptian National Scientific and Technical Information Network (ENSTINET) was created in 1986 by the Egyptian Academy of Scientific Research and Technology (ASRT). ENSTINET has been hosting since 1990. ENSTINET manages a technological platform supporting research in Egypt. It operates the National Research ISSN Egypt Education Network. It collaborates with similar organisations in Europe (GEANT) and the USA (Internet2). ENSTINET also hosts the Egyptian Knowledge Bank Portal, the National Scientific and Technical Repository and a publishing platform among other services. Through agreements with 31 publishers as of 2022, 120 databases are made available to Egyptian researchers and students. ENSTINET and ISSN Egypt have been instrumental in the creation of the Arabic Citation Index with Clarivate (<https://clarivate.com/arabic-citation-index/>) to make research in Arab States more visible' (<https://www.issn.org/enstinet-and-issn-egypt-play-a-leading-role-in-science-communication-in-egypt/>).

this content would be available to them. And some of them, because they were travelling abroad again, were really sad they would not be able to access the EKB from outside Egypt. Their universities abroad did not even have these kinds of resources for them. So, I believe it was a very big success for them and for us.

LH Did academic and scientific output in Egypt increase with the EKB?

MA The published work and the tools available within the EKB helped researchers a lot to write papers and take part in scientific knowledge across the world. My colleagues who follow the rankings and statistics tell me that Egypt has progressed a lot in its research output in the time since the EKB was established.⁴

LH How do you manage the relationship with publishers whose content is on the EKB?

MA My relationship with the publishers revolves around monitoring content and making sure it works and is easily accessed from the EKB platform. In the beginning, we were contacting publishers frequently, especially when an issue or an error arose. If we received information from a user that something like a video was not working, we would contact the publisher to resolve it as soon as possible. Since this is a national project, we also considered security.

For instance, we cannot show the research queries and give information about the people searching on the platform. From the technical side we needed to hide all the content and the users. The publishers themselves do not know who is on the platform and where they are coming from, and so they cannot gather information about them. That was really important for security reasons for the whole country.

3. Kindergarten to Grade 12 Expansion

LH The EKB was initially conceptualized as a platform for researchers, mainly in universities. When Dr. Tarek became Minister of Education in 2017,

⁴ See the companion YouTube video produced by the EDU 2.0 Research and Documentation Project, 'Arabic Publications and Rankings: The Egyptian Knowledge Bank', 1 March 2020, YouTube, <https://www.youtube.com/watch?v=WkkISY8lfyw>

he wanted to use it for all educational stages starting from KG. How did you manage this expansion?

MA Researchers and university students can search for the content they need on the EKB database directly, but we needed to simplify this huge library for students and teachers so that they would not be overwhelmed by the entire database. For K-12 we developed a 'Digital Library' with all educational content related to the basic educational curriculum. We list the subject followed by the grade. You just go to your lesson and find the additional materials related to that lesson. In 2018 we established the Learning Management System (LMS) for Grade 10 students.

LH Why was the LMS initially for Grade 10 students only?

MA There were two reasons for this. First, in 2018, all students in Grade 10 received tablets that were programmed to directly access the EKB and the LMS. Even though the LMS itself started for Grade 10, we expanded to Grades 11 and 12 by 2020. Also, students of that age are mature enough to use the Internet to find the content they need, and it is likely they have been using the Internet for this purpose anyway. We started by getting the Ministry books for Grade 10 in Physics, Chemistry, Biology, and Mathematics. We divided these books into lessons, so we have for example Unit 1: Lesson 1, Unit 1: Lesson 2 and so on. If the students are on the physics module and have a lesson on electricity, for example, the EKB offers content for this topic. If the lesson is on biology, say the cell, the content should be relevant to this. In this way, students can go to the 'Study Guide' in the LMS, click on their lesson, and find the Ministry book and additional content to help them study this topic. This content can be video, text, images, questions, a variety of different content types that we compile from all out publishers, like Encyclopedia Britannica, Nahdet Misr, and others.

LH How do you select this content for specific lessons? How can you ensure that it corresponds to the Ministry's curriculum?

MA Well, we do not just take content from the publishers and import it back to the EKB without checking it. I make sure that all the relevant materials from different publishers are sent to CCIMD. It gets approved

by Dr. Nawal Shalaby, the head of CCIMD (see Chapter 13 in this volume). They check that these materials support the lesson in the Ministry curriculum. They might be videos, images, explanatory text, quizzes, and study questions. All the content is reviewed, approved, and uploaded correctly to the live environment. We make these additional resources available because students prefer different tools for learning. That is a big role for Dr. Nawal's team. Imagine reviewing topics from all the publishers and viewing fifty videos, each video is about five or six minutes. They write feedback about the videos and texts, and then review the revisions made by the publishers to make sure that the updates have been done correctly. This process of back and forth can occur two or three times, until we get the content the way we want it. And to be honest, the people at CCIMD have really been up to the challenge. They are doing the work at their offices and continuing at home. Many times, Dr. Nawal sent me reports at 5:00 a.m. because this is the time they finish them. They are really committed.

LH The LMS has separate portals for English and Arabic. Do you get all the English content translated into Arabic? Is there a process of reviewing the Arabic translations to ensure they meet your standards?

MA This is part of our collaboration with the publishers. They provide us with this content in both English and Arabic. We get a sample of the content from the publisher and make sure it is relevant and of good quality. If it meets this first standard, we send it to Dr. Nawal's team through the sandbox. This sandbox is not the live LMS, it is another platform which only the developers and designated people can access. Dr. Nawal and her team go into the sandbox and review the content. We work closely with CCIMD, topic by topic.

Dr. Nawal sends me the required reports which I pass on to the publishers for feedback. At CCIMD, they sometimes say no to publishing the content as-is because they need to fix something or retranslate some passages. Even if the publisher thinks that this subject or this topic is relevant to the specific lesson, CCIMD might say no, we believe that this topic would be better in another lesson, and we move it. After all the required fixes and modifications are done by the publishers, we re-upload the material to the sandbox and CCIMD reviews the revisions.

There is usually a back and forth with the publishers. The content appears on the platform only after CCIMD gives the final approval.

LH What is the timeline from receiving content from a publisher to putting it on the LMS where students and teachers can access it?

MA Well, it depends on what we need to do. For example, if we are fixing text, it usually takes a maximum of two days to make the changes, put it back on the sandbox, and get it reviewed by CCIMD. Other times, it is a matter of changing a narration for a scientific video. For example, the Arabic scientific terminology might differ in Egypt compared to Syria or other Arab countries. We need to use the same words used in Egyptian schools so students do not get confused. That could take longer.

LH How have your responsibilities at the EKB changed as the platform has expanded?

MA The job description evolved from being a web developer into somehow like project management. This means meeting the requirements from the stakeholders, namely Dr. Tarek and the Ministry of Education who have a vision of how the platform should work, and the publishers who are providing the content. It also requires managing the platform so that all content meets the Ministry's requirements and students can easily access it. We need to make sure that the right content, whether video, infographic, or whatever, appears in the required place in the Study Guide and is correctly labeled for the search with the required tags, keywords, and technical parts. We need to make sure that all the content is accessible from all devices, and I need to check the LMS, mobile devices, and tablets.

LH Do you think the EKB might be changing the society's approach to private lessons? For instance, might there be decreased demand for lessons because of all this freely available material on the EKB?

MA I believe private tutoring is something in the culture now. It is not how students should be taught, but it is part of the culture since the time I was in school. At that time, private tutoring was mainly something for high school students to help students prepare for the Thanaweya Amma. Now, private lessons are starting from Grade 1. This is how lessons have evolved. If parents have the money, they can pay to get a private tutor

and do not have to bother doing any studying with their kids. I believe now with kids using mobile devices, they can find the content they need to help them with their lessons. If it is useful, private tutoring would just gradually decrease. Students will now be able to just rely on themselves. It will not happen overnight, it will take some time.

4. Teachers in the Digital Knowledge Ecosystem

LH We have been talking a lot about researchers and students in relation to the EKB. Can you speak more about teachers in this knowledge ecosystem?

MA I believe teachers are the people who direct students to the required parts in the LMS itself. When you open lesson plans, there is a portion directed to the teacher. Teachers can access the Teacher's Guides in the LMS as well. They can compile videos from Discovery, explanatory text from York Press, questions from Britannica. They can create their own content using videos and images and add whatever they want into a playlist and share it with their students. Before it is published, there will be a cycle to make sure their content is approved by the Ministry and relates to the curriculum. Teachers can interact directly with their students by sharing files, scheduling assignments, monitoring student progress, and having discussions with them. They can get statistics about which questions are being answered correctly and incorrectly. This lets teachers know where the gaps are in what they have taught to their students. They can form their own networks and work together. Also, events can be created for the Ministry and the school itself.

LH This sounds like a lot of extra work for teachers. Do they have support?

MA Yes, if they want, they can ask some very good students to work on the playlists. They need training and proper development to make sure they can use the platform in the best way and not be overwhelmed. Changing from in-person learning to introducing digital learning online is a challenge in itself. For the teacher trainings, Mr. Mahmoud Dawoud usually works with master trainers from the different governorates, and they go to the schools to train teachers. In the coming period, the Ministry of Education has some other projects for training teachers about how to use the EKB and digital devices in education.

5. Pushing Digital Frontiers during a Pandemic

LH The EKB was up and running prior to the pandemic. When schools closed on 15 March 2020, Egypt appeared to be more technically ready for distance learning compared to other countries. From your side, how prepared was Egypt for this shift to online?

MA I believe this was the only platform that maybe predicted that something like this could happen. We had already been trying to make it easier for users to access all materials from home or anywhere, from a smartphone, tablet, or whatever device. We did not know we were going to have a pandemic with everyone staying at home. We did not want this to happen. We hope we will get over this and get back to the streets and schools. But this situation shows that we were right to prioritize such a platform with educational content available for everyone. In the LMS there is a designated workspace where teachers handle content for their students, and there is also a place where Dr. Tarek can send announcements to all students and teachers. This is a way to keep everyone updated.

LH How did you adapt the EKB platform for distance learning during the pandemic? How long did that take?

MA We created a separate platform for students to access all materials without any login or barriers in just four days. We worked around the clock. This work was between CCIMD, our team at LIMS, and other partners. We were over fifty people working on this, because all the team at CCIMD had to check the content for the study platform. Normally these things would take until the next school year, so we had to speed things up. We slept maybe for only an hour or two each day. We worked together to make sure everything would be ready for the users when Dr. Tarek announced the platform on March 19.⁵ I feel proud of this.

LH It is incredible that you prepared everything in such a short period of time. Are you satisfied with the results?

5 See the video posted on Tarek Shawki's Facebook page announcing provisions for the education system under COVID-19 school closures, 19 March 2020, <https://www.facebook.com/tshawki/videos/10222860204678325/>

MA It is nice, but we are still working to make it better. Even if it is good, we do not stop. That is what we are doing right now. We are still preparing a lot for the next school year because we do not know if schools will open in the fall.

LH How have you been able to absorb this huge spike of users coming onto the platform after the pandemic? Do you know the rate of growth of users?

MA I believe there was work on the servers and the hosting to make sure we can absorb this huge spike in users. We also removed the barrier of registration and allowed people to access the EKB by just creating an account. We made another platform called 'study.ekb.eg' where primary and preparatory stage students can just open the URL and get access to the wealth of information available in the LMS without doing any registration. This saves their time and makes it easier for them. Students in Grades 10 and 11 have the tablets and already know about how to access the EKB and how it can help them. I do not have statistics with me. I do not get statistics as this information is usually between the Ministry and ENSTINET and the people who are responsible for hosting the EKB.⁶ But I believe that the numbers have been increasing by a very big percentage, specifically since COVID-19.

Students are currently doing research projects in schools. Almost every household in Egypt has a student working on schoolwork from home. The EKB is the only platform that can provide them with the content they need in a very easy way. My niece had a project about tourism. I helped her search about tourism on the EKB. The information is not from Wikipedia, or some unverified part of the Internet where we do not know who wrote it or reviewed it. When we found material on the EKB, she started telling me, 'Yes, I remember this topic. I remember the teacher speaking about this and I can add something about it'. So, the platform we provided after COVID-19 really helped them.

LH Do you regularly adjust or tweak the EKB?

⁶ The statistics and user numbers for the EKB are not publicly available. Occasionally the Minister of Education mentions some figures in a speech. Other than that, the public does not know how many people use the EKB and with what frequency, the number of downloads, and other information.

MA We do this on an hourly basis. We constantly open the LMS to see if there is any topic not appearing, any technical problem. We check that the search is working and see if it can be enhanced in some way. We are still working on the books, study guides, making sure they will appear correctly. We are getting more content from publishers and making it available for the students in a very good way. The reviews from the CCIMD do not stop, they are reviewing everything in the LMS all the time. We are trying to make sure we give our students a better quality of the content and make it appear for them in an easier way. I am trying my best. We are all trying our best.

6. Companion Video

Video 21.1 Mohamed El-Araby: 'Egyptian Knowledge Bank for Grades K-12', Interview by Linda Herrera, Education 2.0 Research and Documentation Project, 7 May 2020, YouTube, https://www.youtube.com/watch?v=tDZg_OQdn28