Challenges and Issues of Public Education in Saudi Arabia during Covid-19: Review Paper

Ashwaq Hasen Al-Shehri

Ministry of Education, The Directorate of Education in Al-Madinah Al-Munawwarah Region, Madinah, KSA
Email: ashwaqhasen@gmail.com

Abstract

The Covid-19 pandemic compelled many countries to implement the stay-at-home policy, which insisted many employees and workers in variety of industries to work from home. This global crisis also prompted universities, colleges, and schools to conduct their teaching activities online via the Internet. Although online education is favourable for students especially in the era of pandemic, a full mode of online teaching could be associated with many challenges. Particularly, in the Kingdom of Saudi Arabia (KSA), most education sectors were closed down according to government order. The Ministry of Education (MOE) of the KSA began providing online education services in public and private educational institutions. Thus, this paper aims to determine how Covid-19 impacted higher education in the KSA by highlighting the challenges faced by this sector and identifying the best strategies to address these challenges. In this study, the design science approach was applied. The results revealed that the KSA faced several challenges and issues during the Covid-19 pandemic, and the suggested solution is better in dealing with these challenges.

Keywords

Covid-19, Public Education, Design Science Research, Metamodeling

1. Introduction

The outbreak of Covid-19 forced governments and organizations to struggle in dealing with its implications. As a result, major changes emerged in various domains such as government (Shafi et al., 2020; Shah et al., 2020; Tolu et al., 2020), public services (Chen, 2020; Johnson et al., 2020), healthcare (Dewey et al., 2020; Mayer & Lewis, 2020), education (Mishra et al., 2020), transnational labour (Crețan & Light, 2020), geopolitical issues (Chan et al., 2020; Mionel et al., 2020;

Moisio, 2020), global energy market (Connolly et al., 2020), spatial dimensions (Krzysztofik et al., 2020), and economy (Hammour et al., 2020; Kumar et al., 2020). The higher education sector was also subjected to adjustments and faced adverse challenges in its educational operations globally. In March 2020, over 100 countries began closing their schools as a countermeasure in handling the epidemic. This severe situation has afflicted approximately 50% of students worldwide (Viner et al., 2020). Furthermore, the closure of educational institutions had an adverse impact on the economy status of people; many workers had to leave their work because they needed to care of their children's education, and, some students lost their opportunity to participate in school, particularly those with poorer understanding and educational achievement (Viner et al., 2020). Thus, educational institutions attempt to address these challenges by 1) carrying out significant transformations, 2) reviewing important elements of their business processes, and 3) adopting new technologies to continue their educational programs in accordance to new guidelines and procedures (Dwivedi et al., 2020).

The general pandemic situation in Kingdom of Saudi Arabia was under control due to several robust procedures and policies which had taken by the authorities. As part of the monitoring of masks worn by people during navigation, several systems and tools have been developed by the authorities. Figure 1 displays general pandemic situation in Kingdom of Saudi Arabia till now.

Conversely, the requirement of social distance made it necessary to accelerate the required adjustments. Thus, educational institutions had to face challenges such as online teaching module and its delivery to keep up with the rapid digitalization of the curriculum (Crawford et al., 2020). This scenario can be seen in Portugal, in which, when the first case of Covid-19 was identified on the 7th of March 2020, all activities, including education, were suspended officially. In retention, the government enforced online teaching and learning, which prompted the use of digital technologies as a medium of communication between the teacher and the student (Assunção Flores & Gago, 2020; Alshaikh et al., 2021). Furthermore, The United Arab Emirates (UAE) took another preventive measure
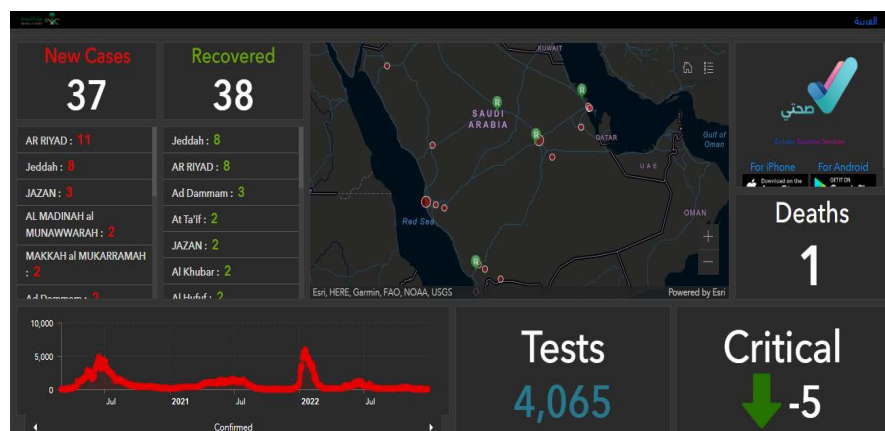
Figure 1. General pandemic situation in Kingdom of Saudi Arabia (Ahmad et al., 2022).

to control the virus from spreading by closing all schools and universities, suspending any outside country from entering the UAE, cancelling all public events, and encouraging online education (Al-Dhaqm et al., 2019; Al-Dhaqm, Abd Razak, et al., 2020a; Alshaikh et al., 2021; Crawford et al., 2020; Shomotova & Karabchuk, 2022).

Following that, higher education institutions in this country attempt to engage students in interactive discussions, whether synchronously (via web-meeting tools) or asynchronously (via discussion boards and other tools). Therefore, most universities began implementing new digitalized education delivery methods (Alotaibi et al., 2022; Crawford et al., 2020). As the pioneer of e-University in the UAE, the University of Hamdan Bin Mohammed has extensive experience in delivering online teaching and learning (Al-Dhaqm et al., 2016). The institutions in the UAE and Sharjah have integrated the Blackboard platform, while the Heriot-Watt University in Dubai has embraced "Vision," a virtual learning delivery (Al-Dhaqm, Razak, et al., 2020b; Crawford et al., 2020). Similarly, most of the sectors in the Kingdom of Saudi Arabia were shut down as per government order once the WHO declared the Coronavirus as a pandemic. On the 9th of March 2020, the Ministry of Education (MOE) of the KSA began providing online education services in public and private educational institutions (Al-Kadri et al., 2020; Khalil et al., 2020; Tanveer et al., 2020).

Therefore, it is necessary to identify the key elements influencing the facilitation and enhancement of the higher education sector's responses to the pandemic. Accordingly, this study aims to determine how Covid-19 impacted higher education in the KSA by highlighting the challenges faced by this sector and identifying the best strategies to address these challenges. In addition, this study emphasizes on recognizing how those rapid changes have affected the levels of student satisfaction in Saudi Arabian universities. The findings of this study are expected to benefit the Saudi educational institutions in better understanding the status of education and learning in the country at the higher education level. This study also presents recommendations to improve the state of teaching and learning in this country. It is important to note that other countries could use the elements found in this study to enhance the effectiveness of their educational systems.

Online learning had affected the social ability of the students. While virtual learning has an obvious bad impact on the education of social skills among students, there are numerous ways educators can assist students develop their social abilities. A absence of face-to-face interface with the teachers or other peers reduces student response, causes social isolation, and may take the lead to students thinking indifferent since there is no sense of stress from the teacher.

Therefore, this study contributes to address the interoperability, heterogeneity, and complexity issues of the public education sector in the KSA by suggesting a new semantic metamodeling language that facilitates in managing, sharing, and reusing domain knowledge in the public education sector. The benefits of the semantic metamodeling language for domain practitioners are as follows:

1) Simplify communication between different domain practitioners through a common representation layer that includes all the processes, concepts, tasks, and activities that must exist in the public education sector.

2) Provide guidelines and a new model development process that assists domain practitioners in managing, sharing, and reusing domain knowledge in the public education sector.

3) Enable domain practitioners to easily create a new solution model by electing and combining sets of concept elements (attributes and operations) based on their model requirements.

4) Enable domain practitioners to gain quick access to previous relevant knowledge from the public education sector and allow them to reuse this knowledge.

The paper is structured as follows: Section 2 provides a list of related works, Section 3 presents the methodology, Section 4 provides the conclusion of study and its future directions.

2. Related Work

During the Covid-19 pandemic crisis in the KSA, a temporary emergency policy was established by MOE to maintain control and facilitation of remote education for both universities and schools to ensure an ongoing education process. To further assist this issue, the MOE implemented online education platforms, such as Vschool.sa, to support virtual classrooms and enrich digital materials. The official online education platform for schools in the KSA is called Vschool.sa (Almaghaslah & Alsayari, 2020). Correspondingly, the courses from the school were available asynchronously at all educational levels on the Ain channel on Arabsat and YouTube (Almaghaslah & Alsayari, 2020). Universities and other institutes of higher learning were given more freedom to govern their academic curricula. However, the MOE adopted a number of policies and methods to maintain student learning, perspectives for the future, and the cumulative average of students (Tanveer et al., 2020). During Covid-19, all the universities in this country adopted e-learning platforms via a popular system, Blackboard. These strategies injected flexibility into the education experience using reliable communication tools. Universities were able to remove a number of barriers to student-teacher interaction as a result, facilitating interaction between all stakeholders (El Zawaidy & Zaki, 2014; Rajab et al., 2020).

A group of researchers in the Qassim University, the College of Medicine and Medical Sciences, conducted a quantitative research to understand the effectiveness of live online streaming learning sessions (Khalil et al., 2020). Their findings revealed high levels of acceptance and approval from medical students. All the participants confirmed that the online sessions allowed them to save more time, which improved their overall performance. Conversely, the participants also mentioned several challenges, for example, content perception, methodological challenges, technical and behavioural challenges, and exams. The participants emphasized the significance of analysing the principles of the online

learning model and learning outcomes rigorously and regularly to determine its effectiveness (Khalil et al., 2020).

Another study was conducted in the King Khalid University (KKU) Pharmacy College to evaluate how satisfied the academic staff was with the transition to virtual learning and how the pandemic-induced suspension has influenced academic work (Almaghaslah & Alsayari, 2020). The academic pharmacy staff revealed through an online survey that KKU's learning environment was already established for the necessary digital transformation. The team from the Pharmacy College also emphasized how much more flexible virtual education compared to the conventional mode. Nevertheless, to successfully transition to a virtual learning environment, the Electronic Learning Deanship needed to provide instructors with adequate online training modules that could facilitate in preparing virtual classroom, recording lectures, and enabling interactive online discussion (Alshaikh et al., 2021). In addition, the findings of that study revealed that the transition to e-learning posed some new challenges due to the absence of direct interactions. Most instructors reported, it was difficult to get students to actively engage in class and complete their assignments and homework with integrity. Other issues raised in the survey (Almaghaslah & Alsayari, 2020) included difficulties in covering all syllabus of the academic and the absence of students in practice sessions.

Additionally, the Al-Faisal University of Riyadh, Saudi Arabia, funded a comparable study (Rajab et al., 2020) to investigate the effects of the Covid-19 fight during the transition from conventional to online education at the College of Medicine (COM). To this end, the researchers designed a questionnaire and sent it via email to target faculty members and students. According to the results, 41% of the respondents had little to no experience with online learning. The findings revealed difficulties with a variety of instruments and academic procedures, including communication, technological use, evaluation, online proficiency, time management, and technophobia. Nevertheless, it was noted that during the initial weeks of implementation, the respondents' belief in the effectiveness of online medical education had improved (Rajab et al., 2020).

Another research conducted at King Saud Bin Abdulaziz University (KSAU-HS) highlighted on the management strategies used by the school's health science colleges to deliver online instruction in response to changes brought on by the epidemic (Al-Kadri et al., 2020). The required focus groups were formed to develop emergency planning using SWOT (strengths, weaknesses, opportunities, and threats). The analysis model that the researchers developed focused on four main areas: 1) the development of faculty abilities, 2) curriculum management, 3) assessment strategies, and 4) technological infrastructure and support. They introduced a model established by KSAU-HS as a framework that guides users in delivering online education in health science colleges (Al-Kadri et al., 2020).

In another similar research, a questionnaire was distributed among selected Saudi university faculty members and students (Abdulrahim & Mabrouk, 2020). The purpose of the study was to determine the effectiveness of technology de-

veloped for digital education during the fourth industrial revolution in managing the pandemic's effects on higher education at these universities (Abdulrahim & Mabrouk, 2020). The current research study also discusses the adaptations made because of the transition from the conventional educational process to the virtual form at academic institutions and universities locally, regionally, and globally. It was discovered that a number of previously completed research in this field examined the Covid-19 impacts on medical education from the perspectives of various stakeholders, including students, faculty members, and staff.

3. Methodology

This study used design science research to reveal the challenges and issues faced by the public education in the KSA during the Covid-19 crisis. Figure 2 illustrates the research methodology used to highlight the challenges and problems of public education in Saudi Arabia during Covid-19:

1) *Searching the existing solutions in the online databases*: this step aims to explore the popular online database (IEEE Explorer, Springer, Scopus, Web of Science, ACM, Science Direct, and Google Scholar) for the relevant studies. The keyword used is "Education and the Covid-19 pandemic". The results of this step are displayed in Table 1. The search was limited to research published between January 2019 and January 2022 in terms of time scope. The other types of publications were excluded from the current paper's focus in favour of works like research articles, conference papers, dissertations, books, and book chapters. Additionally, the copies and testing of the subject and abstracts were disregarded. Lastly, it was found that 70 out of 2378 papers focused on processes and technology perspectives in this field. Table 1 reviews the details of the search procedures utilized in this research.
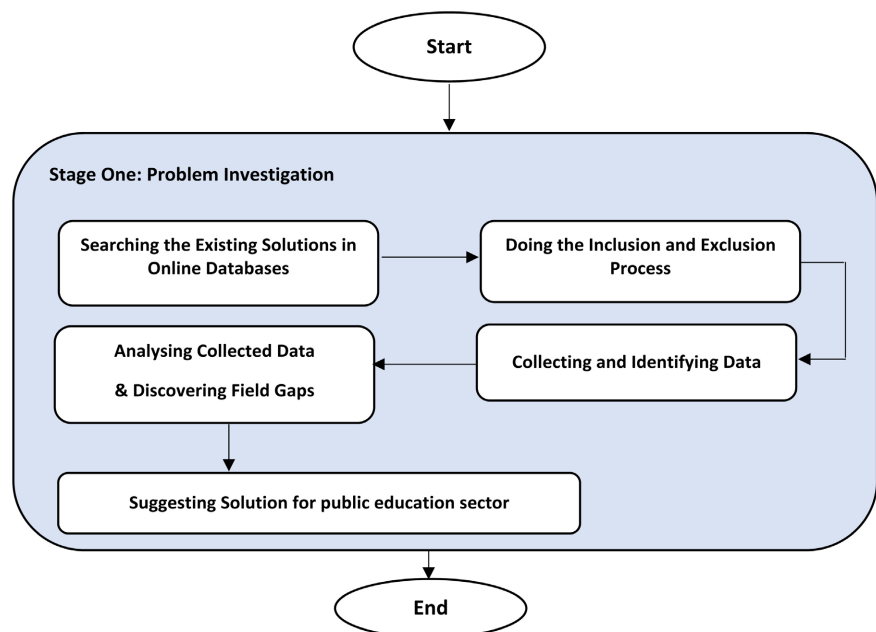

Figure 2. Research methodology.

Table 1. Reviews the details of the search procedures utilized in this research.

Database Search Engines	Related Articles
Web of Science	6
Scopus	6
IEEE Explore	3
Springer Links	50
Google Scholar	2040
ACM	0
Science Direct	264
Total	2378

2) *Doing the inclusion and exclusion process*: This stage contains and eliminates the searched results. The following study questions are used to categorize the search methods:

- What are the existing studies that are relevant to education during the COVID19 pandemic?
- What are the current limitations and challenges of the existing studies?

3) *Collecting and identifying data*: At this stage, authors gather data based on stages 1 and 2 and then, the data is improved depending on the journal year, relevancy, and excellence. Furthermore, only articles that discussed the challenges and issues of public education in KSA during the pandemic were selected. The title and author names are used in a second manual categorization method where it is expected to prevent duplicated content from different sources. Finally, 70 articles out of 2378 were used in this research based on the above criteria.

4) *Analysing collected data and discovering the field gaps*: through this survey, the papers discussed the pandemic from several perspectives. For example, (Almaghaslah & Alsayari, 2020) utilized an information and communication technology model to evaluate the academic staff's satisfaction at King Khalid University with remote learning and its influence on administrative work using the Questionnaire approach. The second study by (Rajab et al., 2020) at Al Faisal University analysed the management practices used by Health Sciences Colleges to deliver online education through surveys among students and faculty members. Another study used SWOT analysis introduced by (Al-Kadri et al., 2020) in the King Saud Bin Abdulaziz University to determine the effectiveness of simultaneous online learning on medical students using focus group method. The impact of Covid-19 on higher education at Qassim University was examined by (Khalil et al., 2020) using focus groups and interviews to examine the technologies of the fourth industrial revolution and the rise of digital educational transformation. In addition, (Abdulrahim & Mabrouk, 2020) proposed a study to investigate the effectiveness of the technologies of the fourth industrial revolution, specifically the rise of digital educational transformation, mitigate the effects of

Covid-19 on higher education. The developed hypothesis approach and surveys of students and teachers were used in this study, which concentrated on different universities.

Thus, the authors discovered that the KSA's public education system faced several challenges and issues throughout the epidemic, as shown in **Figure 3**:

- Practical Lessons (Labs): Once students have moved off campus, how can virtual techniques be used to conduct lectures and tutorials in disciplines that can be completely essential? Online learning would fail if practical lessons were not held.
- Completion of the Course: As part of their education program, students are required to complete internships with industries. How would students be able to participate in internships profitably if educational institutions and businesses are shut down due to a lockdown? In the future, certain industries might resume, but will they be able to accommodate internship requirements while focusing on production and sales?
- Attendance for Examinations: There are no direct physical interactions between students and instructors, therefore students might do other things behind their computers. There is no absolute way to control and monitor them.
- Assessment Methods: The methods for evaluation students' performance and understanding such as assignments, quizzes, and tests are not as effective as in classroom teaching, since students may cheat and copy their friends' tasks.
- Virtual Attendance of Students: Are phone calls and webinars beneficial to students? Because many students are acting as proxies for webinars by turning off their visuals and audios, teachers are perplexed by student virtual attendance.
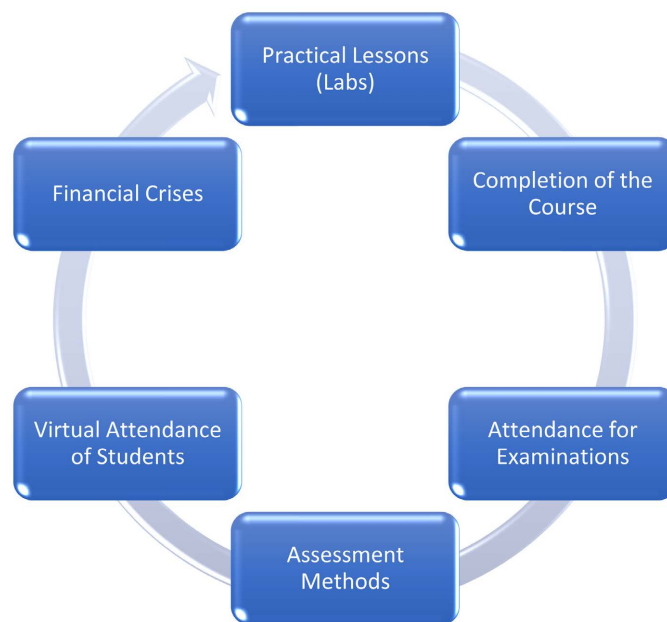
Figure 3. Challenges and issues of the public education in the KSA during the Covid-19 pandemic.

- Financial Crises: The financial crisis in higher education caused by the Covid-19 pandemic is paramount; many universities, institutions, and colleges have recently announced they will lay off employees. These institutions had to reduce their financial expenses due to the economic recession caused by Covid-19 pandemic.

5) *Suggesting Solution for the public education sector*: this study suggests a semantic metamodeling language to reduce the complexity, heterogeneity, ambiguity, and interoperability of the general education sector in the KSA during Covid-19. The suggested solution allows domain users to manage, share, and reuse domain knowledge related to public education sector.

Metamodeling is a general technique for integrating and defining models from different domains. Common terms for these different views can be identified and shared (Ameerbakhsh et al., 2021). The metamodeling technique can be applied in various fields, especially for standardization. Metamodeling can be defined as identifying general terms in each problem domain and their relationship. Therefore, metamodels should be well defined and well-organized since it is used to solve the complexity, interoperability, and heterogeneity of the domain.

The ideal solution to address the difficulties and problems of the Covid19 in the KSA is shown in Figure 4. There are three levels which are level-3 metamodel, level-2 domain model, and level-1 user domain model. The level-3 metamodel consists of whole meta-meta information that governs the second-level concepts' behaviours (level-2 domain model). The level-2 domain model consists of the meta-data used to govern the behaviours of the level-1 user domain model. The steps of the suggested solution are thoroughly explained in the following paragraphs.

To develop the suggested solutions for the public education sector in the KSA, the authors should follow these steps:

1) Identify and select the public education sector models.

2) Extract the common terms from the selected models.

3) Harmonize and combine the extracted terms.

4) Propose the common terms of the general education sector.

5) Develop the comprehensive model (metamodel) for the public education sector.

The authors discovered that the education system in the Kingdom of Saudi Arabia had a number of challenges and issues during the pandemic. For example, once students have moved off campus, how can virtual techniques be used to conduct lectures and tutorials in disciplines that can be completely essential? Online learning would fail if practical lessons were not held. Besides, students must also complete internships with industry as part of their academic course. How would students be able to engage in internships if educational institutions and businesses are closed due to lockdown? Some industries may resume in the future, but will they be able to accommodate internship requirements while continuing to focus on production and sales?
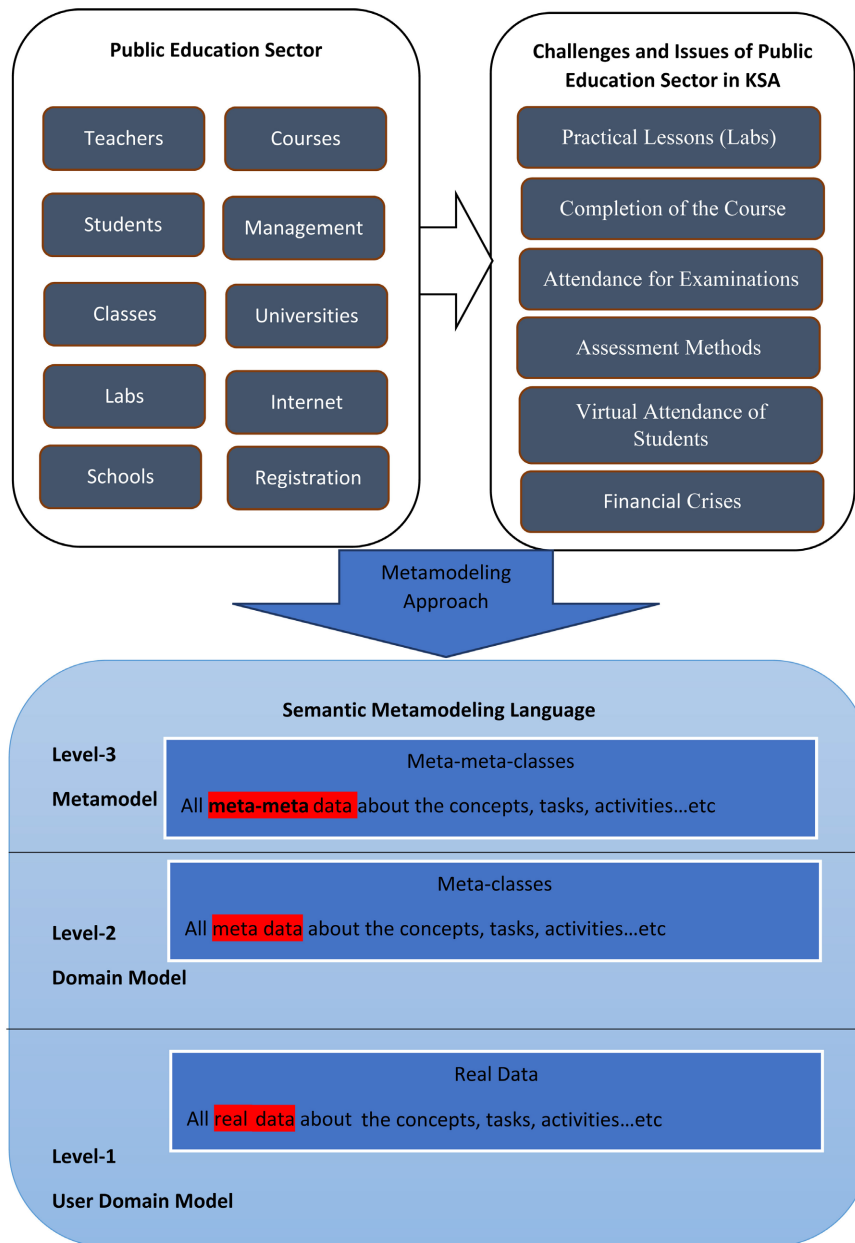
Figure 4. The suggested solution for the public education sector in KSA.

Thus, this study suggested a semantic metamodeling language for the public education sector in KSA to overcome these challenges and issues.

4. Conclusion

Public education is a very significant sector throughout the world. It suffered greatly during the pandemic Covid-19. In specific, the public education sector in the KSA was affected by the virus outbreak. There are several challenges and issues associated with this sector especially when the educational institutions are compelled to switch to a full mode of online teaching. Most education sectors in the Kingdom of Saudi Arabia (KSA) were closed by government order. The

Ministry of Education (MOE) of the Kingdom of Saudi Arabia (KSA) began offering online education services in public and private educational institutions. This study emphasized the challenges and issues that the Kingdom of Saudi Arabia's Ministry of Education (MOE) experienced during the pandemic. Henceforth, the semantic metamodeling language was proposed to address the discovered challenges and issues in the KSA's public education sector. The semantic metamodeling language for the public education sector will be developed and validated in the future.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

Abdulrahim, H., & Mabrouk, F. (2020). COVID-19 and the Digital Transformation of Saudi Higher Education. *Asian Journal of Distance Education, 15,* 291-306.

Ahmad, T., Murtaza, B. N., Ahmad, F., Murad, M. A., Baig, M., Imtiaz, A., Baig, F., Baig, J., Siraj, M., & Sagga, A. K. (2022). Coronavirus Disease 2019 Pandemic Effects on Overseas Pakistanis Particularly Residing in China, Saudi Arabia and United Kingdom. *Frontiers in Public Health, 10,* Article 768812. https://doi.org/10.3389/fpubh.2022.768812

Al-Dhaqm, A., Abd Razak, S., Dampier, D. A., Choo, K.-K. R., Siddique, K., Ikuesan, R. A., Alqarni, A., & Kebande, V. R. (2020a). Categorization and Organization of Database Forensic Investigation Processes. *IEEE Access, 8,* 112846-112858. https://doi.org/10.1109/ACCESS.2020.3000747

Al-Dhaqm, A., Abd Razak, S., Siddique, K., Ikuesan, R. A., & Kebande, V. R. (2020b). Towards the Development of an Integrated Incident Response Model for Database Forensic Investigation Field. *IEEE Access, 8,* 145018-145032. https://doi.org/10.1109/ACCESS.2020.3008696

Al-Dhaqm, A., Razak, S. A., Othman, S. H., Nagdi, A., & Ali, A. (2016). A Generic Database Forensic Investigation Process Model. *Jurnal Teknologi, 78,* 45-57. https://doi.org/10.11113/jt.v78.9190

Al-Dhaqm, A., Razak, S., & Othman, S. H. (2019). Model Derivation System to Manage Database Forensic Investigation Domain Knowledge. In *2018 IEEE Conference on Application, Information and Network Security (AINS)* (pp. 75-80). IEEE. https://doi.org/10.1109/AINS.2018.8631468

Al-Kadri, H. M., Al Moamary, M., & Al Knawy, B. (2020). Framework for Curriculum Delivery during COVID-19 Pandemic in a Health Sciences University. *Annals of Thoracic Medicine, 15,* 185-189. https://doi.org/10.4103/atm.ATM_493_20

Almaghaslah, D., & Alsayari, A. (2020). The Effects of the 2019 Novel Coronavirus Disease (COVID-19) Outbreak on Academic Staff Members: A Case Study of a Pharmacy School in Saudi Arabia. *Risk Management and Healthcare Policy, 13,* 795-802. https://doi.org/10.2147/RMHP.S260918

Alotaibi, F. M., Al-Dhaqm, A., & Al-Otaibi, Y. D. (2022). A Novel Forensic Readiness Framework Applicable to the Drone Forensics Field. *Computational Intelligence and Neuroscience, 2022,* Article ID: 8002963. https://doi.org/10.1155/2022/8002963

Alshaikh, K., Maasher, S., Bayazed, A., Saleem, F., Badri, S., & Fakieh, B. (2021). Impact

of COVID-19 on the Educational Process in Saudi Arabia: A Technology-Organization-Environment Framework. *Sustainability, 13,* Article No. 7103. https://doi.org/10.3390/su13137103

Ameerbakhsh, O., Ghabban, F. M., Alfadli, I. M., AbuAli, A. N., Al-Dhaqm, A., & Al-Khasawneh, M. A. (2021). Digital Forensics Domain and Metamodeling Development Approaches. In *2021 2nd International Conference on Smart Computing and Electronic Enterprise (ICSCEE)* (pp. 67-71). IEEE. https://doi.org/10.1109/ICSCEE50312.2021.9497935

Assunção Flores, M., & Gago, M. (2020). Teacher Education in Times of Covid-19 Pandemic in Portugal: National, Institutional and Pedagogical Responses. *Journal of Education for Teaching, 46,* 507-516. https://doi.org/10.1080/02607476.2020.1799709

Chan, K. W., Gentile, M., Kinossian, N., Oakes, T., & Young, C. (2020). "More-than-Viral" Eurasian Geographies of the COVID-19 Pandemic: Interconnections, Inequalities, and Geopolitics. *Eurasian Geography and Economics, 61,* 343-361. https://doi.org/10.1080/15387216.2020.1840414

Chen, X. (2020). Spaces of Care and Resistance in China: Public Engagement during the COVID-19 Outbreak. *Eurasian Geography and Economics, 61,* 435-447. https://doi.org/10.1080/15387216.2020.1762690

Connolly, R., Hanson, P., & Bradshaw, M. (2020). It's déjà vu All over Again: COVID-19, the Global Energy Market, and the Russian Economy. *Eurasian Geography and Economics, 61,* 511-531. https://doi.org/10.1080/15387216.2020.1776627

Crawford, J., Butler-Henderson, K., Rudolph, J., Malkawi, B., Glowatz, M., Burton, R., Magni, P., & Lam, S. (2020). COVID-19: 20 Countries' Higher Education Intra-Period Digital Pedagogy Responses. *Journal of Applied Learning & Teaching, 3,* 9-28. https://doi.org/10.37074/jalt.2020.3.1.7

Crețan, R., & Light, D. (2020). COVID-19 in Romania: Transnational Labour, Geopolitics, and the Roma 'Outsiders'. *Eurasian Geography and Economics, 61,* 559-572. https://doi.org/10.1080/15387216.2020.1780929

Dewey, C., Hingle, S., Goelz, E., & Linzer, M. (2020). Supporting Clinicians during the COVID-19 Pandemic. *Annals of Internal Medicine, 172,* 752-753. https://doi.org/10.7326/M20-1033

Dwivedi, Y. K., Hughes, D. L., Coombs, C., Constantiou, I., Duan, Y., Edwards, J. S., Gupta, B., Lal, B., Misra, S., & Prashant, P. (2020). Impact of COVID-19 Pandemic on Information Management Research and Practice: Transforming Education, Work and Life. *International Journal of Information Management, 55,* Article ID: 102211. https://doi.org/10.1016/j.ijinfomgt.2020.102211

El Zawaidy, H., & Zaki, H. (2014). Using Blackboard in Online Learning at Saudi Universities: Faculty Member's Perceptions and Existing Obstacles. *International Interdisciplinary Journal of Education, 3,* 141-150. https://doi.org/10.12816/0006902

Hammour, M. A., Abuhammour, W., & Alfalah, S. F. M. (2020). *Agility and COVID-19 Pandemic 'Success and Failure'.* SSRN. https://doi.org/10.2139/ssrn.3633179

Johnson, S. U., Ebrahimi, O. V., & Hoffart, A. (2020). PTSD Symptoms among Health Workers and Public Service Providers during the COVID-19 Outbreak. *PLOS ONE, 15,* e0241032. https://doi.org/10.1371/journal.pone.0241032

Khalil, R., Mansour, A. E., Fadda, W. A., Almisnid, K., Aldamegh, M., Al-Nafeesah, A., Alkhalifah, A., & Al-Wutayd, O. (2020). The Sudden Transition to Synchronized Online Learning during the COVID-19 Pandemic in Saudi Arabia: A Qualitative Study Exploring Medical Students' Perspectives. *BMC Medical Education, 20,* Article No. 285. https://doi.org/10.1186/s12909-020-02208-z

Krzysztofik, R., Kantor-Pietraga, I., & Spórna, T. (2020). Spatial and Functional Dimensions of the COVID-19 Epidemic in Poland. *Eurasian Geography and Economics, 61,* 573-586. https://doi.org/10.1080/15387216.2020.1783337

Kumar, S., Maheshwari, V., Prabhu, J., Prasanna, M., Jayalakshmi, P., Suganya, P., Malar, B. A., & Jothikumar, R. (2020). Social Economic Impact of COVID-19 Outbreak in India. *International Journal of Pervasive Computing and Communications, 16,* 309-319. https://doi.org/10.1108/IJPCC-06-2020-0053

Mayer, J. D., & Lewis, N. D. (2020). An Inevitable Pandemic: Geographic Insights into the COVID-19 Global Health Emergency. *Eurasian Geography and Economics, 61,* 404-422. https://doi.org/10.1080/15387216.2020.1786425

Mionel, V., Neguț, S., & Mionel, O. (2020). Pandemopolitics. How a Public Health Problem Become a Geopolitical and Geoeconomic Issue. *Eurasian Geography and Economics, 61,* 389-403. https://doi.org/10.1080/15387216.2020.1828125

Mishra, L., Gupta, T., & Shree, A. (2020). Online Teaching-Learning in Higher Education during Lockdown Period of COVID-19 Pandemic. *International Journal of Educational Research Open, 1,* Article ID: 100012. https://doi.org/10.1016/j.ijedro.2020.100012

Moisio, S. (2020). State Power and the COVID-19 Pandemic: The Case of Finland. *Eurasian Geography and Economics, 61,* 598-605. https://doi.org/10.1080/15387216.2020.1782241

Rajab, M. H., Gazal, A. M., & Alkattan, K. (2020). Challenges to Online Medical Education during the COVID-19 Pandemic. *Cureus, 12,* e8966. https://doi.org/10.7759/cureus.8966

Shafi, M., Liu, J., & Ren, W. (2020). Impact of COVID-19 Pandemic on Micro, small, and Medium-Sized Enterprises Operating in Pakistan. *Research in Globalization, 2,* Article ID: 100018. https://doi.org/10.1016/j.resglo.2020.100018

Shah, A. U. M., Safri, S. N. A., Thevadas, R., Noordin, N. K., Abd Rahman, A., Sekawi, Z., Ideris, A., & Sultan, M. T. H. (2020). COVID-19 Outbreak in Malaysia: Actions Taken by the Malaysian Government. *International Journal of Infectious Diseases, 97,* 108-116. https://doi.org/10.1016/j.ijid.2020.05.093

Shomotova, A., & Karabchuk, T. (2022). Navigating COVID-19: Female Ph.D. Students Coping with Family, Academic, and Job Duties. *Journal of International Women's Studies, 23,* 57-75.

Tanveer, M., Bhaumik, A., Hassan, S., & Haq, I. U. (2020). Covid-19 Pandemic, Outbreak Educational Sector and Students Online Learning in Saudi Arabia. *Journal of Entrepreneurship Education, 23.*

Tolu, L. B., Ezeh, A., & Feyissa, G. T. (2020). How Prepared Is Africa for the COVID-19 Pandemic Response? The Case of Ethiopia. *Risk Management and Healthcare Policy, 13,* 771-776. https://doi.org/10.2147/RMHP.S258273

Viner, R. M., Russell, S. J., Croker, H., Packer, J., Ward, J., Stansfield, C., Mytton, O., Bonell, C., & Booy, R. (2020). School Closure and Management Practices during Coronavirus Outbreaks Including COVID-19: A Rapid Systematic Review. *The Lancet Child & Adolescent Health, 4,* 397-404. https://doi.org/10.1016/S2352-4642(20)30095-X