Letter to Editor

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Requirements of the Post-Pandemic World: A Call to Include Augmented Reality to Renovate Traditional Textbooks

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Dear Editor

The present age witnesses incredibly huge volumes of human knowledge in the cyberspace which facilitates access to knowledge either in the form of science or pseudo-science (1). In addition, individuals are now familiar with search tools on the web for meeting their daily basic needs (such as transportation and banking) and some of their higher-order needs such as health, diseases and lifestyle. Admittedly, the pandemic era gave rise to the prevalence of virtual tools in education and daily life. Now in the post-Covid-19 world, learners tend to find a solution to most of their educational needs in particular from the worldwide web (2), and most may even develop a sense of disinclination towards traditional higher textbooks. While specialists are trained in universities or higher education institutes, cyberspace facilities (e.g. YouTube, etc.) keep functioning like freely-accessed virtual learning environments where individuals from miles away attend virtual presentations to acquire functional skills (3) for self-employment, only some of whom may seek degrees/certificates in due course if universities succeed in recruiting them into innovative and blended programs. Consequently, when admitted to universities, these individuals bring unknown worlds of ideas into educational settings.

In order to meet the needs of these less explored identities, academic course-books and textbooks, reflecting course curricula, may only partly respond to their desires. Most of these textbooks are published years earlier and prompt revisions may take no less than months/years, for instance. In addition, university instructors should take the responsibility to enrich the contents by either assigning creative extra materials or fine-tuning their classroom lectures; therefore, they should constantly update their knowledge and skills, and move on the edges of science to which the global population of learners are exposed. Being able to understand the current population of learners, teachers of all grades including the tertiary education cannot be considered as qualified to teach nowadays only because of their degrees, neither due to knowledge of foreign languages nor computer skills.

Needs for updating the educational curricula also turn inevitable in the present age. In addition, the half-life of human science is becoming shorter and shorter because of case reports, evidence-based recommendations, needs for social responsiveness, and requirements for multi-domain schooling, among others. In response, the international arena becomes a court of hectic competitions for rivaling institutes/universities in the hope of gaining a share for global impact and prestige. In short, these changes dominate three aspects: training up-to-date and competent

teachers, constantly revising the curricula, and revising the academic course-books. The latter is of course the focus of this short communication.

While continually revising and publishing newer versions of an academic book is both impractical and less economical, attempts to enrich a curriculum-based textbook with modern technology is both logical and practical (4). The former will be very costly but the latter can take place much faster and easier. For instance, technologies of augmented reality (AR) and virtual reality (VR) are in place to turn learners' instruction and engagement more pleasant and make it more effective and motivating; these often reflect an updated image of the instructors who help learners boost individualized development with brilliant innovative materials added to paper materials (5). By definition, augmented reality is an experience which is interactive and the real world and computer-generated content is combined in it to include visual and auditory modalities into contents and achieve situated learning in context. For instance, readers of a renovated textbook will find a printed page with an image of the skull, different parts of which are labelled; they may use a smart phone to move, rotate, and interact with the 3-D visualized illustration of the bone, for better understanding of relevant concepts such as the structure, fractures, and surgeries. Audio and video files will be accessible by wireless connection as well. Similarly, virtual reality is a simulated experience employing 3-D near-eye displays to give the user an immersive feel of a virtual world (6). Using simulators, this provides readers of a renovated textbook to interactively learn, frequently watching a process to grasp the details and complexities. For instance, a learner can be allowed to interactively practice the right positioning of a surgical candidate's head to alleviate sleep apnea under VR applications, while using a traditional textbook, learners were restricted to reading paragraphs and viewing some illustrations.

By the assistance of these technologies, printed materials can be updated at certain time intervals by materials developers to catch up with new findings and trends in terms of both scientific content and methods of teaching. Additionally, this hybrid orientation can tactfully cater for the shortcomings of printed textbooks, provided that the latter are already founded on a solid curricula with a reliable backbone, only requiring novel add-ons to update them. Expectedly, learners of the present age will find it a pleasing experience to meet their development needs in an interactive learning environment if both content and technology link up to fill the existing gap. When combined with printed textbooks and easily reached with smartphones, augmented reality can transform printed books into interactive, updateable learning sources only at a click on a QR-Code for instance. The augmented portion of the text is possible to be updated, whereas the printed words of the text cannot. Links can be refreshed, and more pertinent information can be included in them; this can efficiently promote the utility and longevity of a book, hence bearing an economical advantage.

Students still confused after attending classes can watch complementary videos, listen to audio files, and see animated images/graphics to better understand the concepts and repeatedly struggle to disambiguate misconceptions; online tests and lectures become feasible too. Evidence from previous studies showed that students using QR codes to access further innovative materials appeared superior to non-users (7). Simply put, augmented reality turns books from static sources of information and knowledge into interactive and non-static means which can be used to better help the readers to enhance their experience in learning. In short, to cater for the needs of the 21st century university applicants, we need to integrate current technology into traditional array of educational wealth such as printed books before we totally say farewell to them. No doubt, such a transformation requires both research and practice.

Conflict of Interest

Nasrin Shokrpour, as the English Editor, was not involved in the peer-review and decision making processes for this manuscript. A team of independent experts were formed by the Editorial Board to review the article without her knowledge.

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