Editorial

Application of the computer-based testing in Korean medical licensing examination, the emergence of a metaverse in medical education, journal metrics and statistics, and appreciation to reviewers and volunteers

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Computer-based testing adopted in Korean medical licensing examination on January 6-7, 2022
On January 6-7, 2022, computer-based testing (CBT) was adopted in the Korean medical licensing examination (KMLE) [1] (Fig. 1). It is the first case of adoption of CBT out of 26 health professional licensing examinations in Korea. Of course, smart device-based testing (SBT), a variant of CBT, was already adopted in the Korea emergency medicine technician licensing examination in 2017 [2]. Examinees’ demographic characteristics and perceived acceptability of SBT did not affect the SBT mock test scores of emergency medicine technician students in Korea [3]. After installing CBT in medical licensing examination, it will be expanded to all other 24 professionals, including dentists, oriental medicine doctors, and care-workers, until 2025 [1].

On March 21, 2003, presenters first proposed CBT and computerized adaptive testing (CAT) for Korean medical licensing examination at the seminar of the Institute of Medical Education of Hallym University in Chuncheon Sejong Hotel. At that time, the staffs of the Korea Health Personnel Licensing Examination Institute (KHPLEI) attended the seminar. It passed 19 years since CBT and CAT were suggested for licensing examination in Korea.

In November 2011, the Standing Committee of the KMLE recommended introducing computerized testing to the KMLE, including CBT and CAT [4]. I also suggested the increase in the quality of the KMLE according to the introduction of computerized testing, and medical schools should prepare for the new testing environment of the KMLE [4]. The 6th president of KHPLEI, Dr. Myung-Hyun Chung [5] (August 1, 2012-July 31, 2015), announced that the research and development on CBT and ubiquitous-based testing would be speeded in January 2013. After that, the researches on CBT were activated. For example, the linear programming method was suggested to construct equated-item sets that reflect each content area. The best choice was to divide the predicted correct answer rate into 2 or 3 difficulty boundaries regardless of common items [6]. Because SBT was already well implemented in Korea emergency medicine technician licensing examination [3], there was no need to repeat the examinees’ adaptability to CBT. It remained only the decision-making by the president of KHPLEI. Dr. Yoon-Seong Lee, the 8th president, finally decided it.
CBT has already been a very common testing platform in most medical schools. For example, in Hallym University, CBT was introduced in 1999 for clinical course testing. For my parasitology class, CBT was already introduced in 1993. My students have no difficulties in taking CBT. A new task after adopting CBT is to guarantee item quality, including audio-visual materials. CBT items should be more clinically oriented than paper-and-pencil to test examinees’ clinical competency. Furthermore, the number of items to measure the examinee’s latent trait should be reconsidered. The distribution of core clinical content is required, and the balance between reliability and core clinical presentations should be guaranteed for the desirable item numbers. The standard setting for CBT, including modified Angoff, modified Ebel, and Hofstee methods, should be implemented soon instead of the cut score, success rate 60% [7, 8]. It is necessary to maintain a consistent passing rate regardless of item difficulties.

**Study size estimation and arrival of a metaverse in medical training in Korea**

There were two invited reviews as follows: “Sample size determination and power analysis using the G*Power software” by Dr. Hyun Kang [9] and “Educational applications of metaverse: possibilities and limitations” by Dr. Kye et al. [10]. One editorial was also invited: “Training in lung cancer surgery through the metaverse, including extended reality, in the smart operating room of Seoul National University Bundang Hospital, Korea” by Huilyung Koo [11].

Although Dr. Kang is an anesthesiologist, he has studied statistics after graduating from Korea National Open University with a major in Statistics. I invited him as a statistical editor in 2021. I asked him to submit the review on determining the study size for authors and reviewers of the journal. When I read the submitted manuscripts to the journal, the most challenging work was to check the appropriate study size estimation. Many manuscripts were not described in the study size estimation. If estimation before the study was not possible, it is recommended to make a posthoc analysis. Dr. Kang told that “the null and alternative hypothesis, effect size, power, alpha, type I error, and type II error should be described when calculating the sample size or power” [9]. I hope this
invited methodological review is helpful for authors and researchers.

The year 2021 was the year of metaverse [12]. Although metaverse is already known terminology and technology, its use exploded in the COVID-19 pandemic era since many people could not meet face to face. This was the same case in health education. My University also trained faculty members on how to use Gather, one of the virtual educational spaces of metaverse platforms, called the virtual world. Unfortunately, I could not apply this platform for my medical students in 2021 due to my unpreparedness. I will use this platform or other virtual educational space for this year’s parasitology class. Several types of the metaverse, including augmented reality, mirror world, lifelogging, and virtual reality, have already been introduced in medical and health education.

I did a PubMed search with the keyword “metaverse“, and only 11 articles were found on January 8, 2022. This does not mean the number of articles on metaverse is small. Before that, articles on the four types of metaverse had been published frequently. It soared in 2021 (Fig. 1, Suppl. 1) and the terminology ”metaverse“ began to appear in the biomedical articles in 2020 and 2021. There were already 4 articles on this topic in JEEHP: virtual reality (VR) endotracheal intubation training [13]; digital technologies introduced in medical and dental education [14]; a simulation-based blended training model on nurses [15], and virtual reality training to decreases rates of needle stick/sharp injuries [16].

According to the usage trends of term “metaverse“, one review article [10] was invited as an abridged English translation of the issue report by the Korea Education and Research Information Service. Dr. Bokyung Kye, Director of the Global Policy Research Section, kindly provided this report for the journal's readers. This review article is a broad introduction to the educational application of metaverse. The definition of terminology was explained, and the current example of metaverse use was introduced. It also included the application in health education. I hope this accessible and comprehensive review article is helpful for medical and health educators to understand the concept of metaverse, strength, and limitation of its application. Also, Ms. Huilyung Koo, a senior reporter in JTBC, one of the well-known
broadcasting companies in Korea, wrote an editorial [11] on the use of metaverse to train chest surgeons in Seoul National University Bundang Hospital. This training course was an example of extended reality (XR) implemented by mixing augmented reality (AR) and virtual reality (VR). XR refers to all VR technologies ranging from VR to mixed reality (MR) and AR.

Journal metrics and statistics

In 2021, JEEHP received the first Journal Citation Indicator (JCI) value, 0.51, in June 2021. It means that the citation impact of articles from 2017 to 2019 was about half of the average citation impact of Web of Science Core Collection journals. JEEHP’s ranking of JCI in the scientific education category was 9th out of 35 ESCI journals (74.3%) and 47th out of 78 SCIE and ESCI journals (39.8%) [17]. To receive a higher JCI value, the more citation frequency of citable articles was essential. The 2021 JCI may be announced in June 2022 by Clarivate(R). I anticipate a higher 2021 JCI than that in 2020.

Bibliometric statistics for the author’s country and total cites were presented in Figs. 3 and 4 (Suppl. 2), respectively. There were authors from 15 countries, mainly from Asia, which reflect the regional scope of JEEHP. Total cites continuously increased. In 2021, JEEHP was cited 525 times in the Crossref metadata, 555 times in Scopus, and 461 times in Web of Science Core Collection. Manually calculated impact factor in Web of Science increased to 1.846 in 2021 from 1.254 in 2020. CiteScore™ Tracker 2021 calculated by Scopus was 2.5 (366 citations 2018 to date/145 document 2018 to date), last updated on January 5, 2022, which is available from: https://www.scopus.com/sourceid/21100467423. This value is higher than that in 2020 (1.7).

Table 1 presents journal statistics in 2021. The number of unsolicited submissions (296) increased in 2020 (275). However, the number of publications decreased from 44 in 2021 to 33 in 2021. It is primarily originated from the low number of commissioned articles in 2021. The acceptance rate of unsolicited manuscripts 8.9% was lower than that in 2002 (10.6%). In 2020, the first year of COVID-19, the number of submissions (286) was nearly doubled compared to 2019
This sharp increase was a common phenomenon seen in other scholarly journals in Korea [18]. The amount of submission to this journal was consistent in 2021.

I should be cautious to select the manuscript for review. The number of rejected or withdrawn manuscripts after the review was 16 in 2020. It was 10 in 2021. The number of accepted manuscripts after review was 26 out of 43 (70.3%) in 2021. In 2022, the editorial office will do its’ best to select the acceptable manuscripts for review to save reviewers’ time.

Table 1. Journal statistics of manuscripts submitted to Journal of Educational Evaluation for Health Professions from January 1 to December 31, 2021

<table>
<thead>
<tr>
<th>Number</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manuscripts submitted</td>
<td>302</td>
</tr>
<tr>
<td>No. of commissioned manuscripts</td>
<td>6     Editorial, 4; review, 2</td>
</tr>
<tr>
<td>No. of unsolicited manuscripts</td>
<td>296</td>
</tr>
<tr>
<td>Manuscripts under re-submission, review, or revision</td>
<td>6 Under re-submission, 4; Under review, 2</td>
</tr>
<tr>
<td>Manuscripts rejected without review</td>
<td>253 Unsuitable, 250; other reasons, 3</td>
</tr>
<tr>
<td>Manuscripts reviewed out of 290 unsolicited manuscripts</td>
<td>37 Accepted and published, 26; rejected 10; withdrawn, 1</td>
</tr>
<tr>
<td>No. of publications out of 296 submitted manuscripts in 2021</td>
<td>32 One articles published in 2021 was submitted in 2020</td>
</tr>
<tr>
<td>No. of publications out of 290 unsolicited manuscripts</td>
<td>26 Opinion, 1; Review, 4; Research article, 14; Brief report, 5; Educational/faculty development material, 2</td>
</tr>
<tr>
<td>Acceptance rate overall (%)</td>
<td>10.8 32/296=0.108</td>
</tr>
<tr>
<td>Acceptance rate of unsolicited manuscripts (%)</td>
<td>8.9 26/290=0.089</td>
</tr>
<tr>
<td>Median time from submission to the first decision (day)</td>
<td>15</td>
</tr>
<tr>
<td>Median time from submission to publication (day)</td>
<td>43</td>
</tr>
<tr>
<td>Median time from acceptance to publication (day)</td>
<td>1</td>
</tr>
</tbody>
</table>

Appreciation to reviewers and volunteers
I was deeply indebted to reviewers who voluntarily devoted themselves to reviewing the manuscripts. Their role is essential to maintaining the journal quality. I regret to send them manuscripts that were finally rejected.

Below are the reviewers’ names and affiliations by country.

**Australia**: Boaz Shulruf, University of New South Wales; Elio Stefan Arruzza, University of South Australia

**Chile**: Castillo Niño Manuel, University of Chile

**Indonesia**: Armyanti Ita, Tanjungpura University; Romiko, Muhammadiyah University of Palembang

**India**: Upree Dhaliwal, University of Delhi; Kiran Goswami, All India Institute of Medical Sciences; T S Gugapriya, All India Institute of Medical Science, Manjiri Phansalkar, Pondicherry Institute of Medical Sciences

**Israel**: Colin Block, The Hebrew University of Jerusalem

**Italy**: Colaceci Sofia, Saint Camillus International University of Health Sciences

**Korea**: A Ra Cho, The Catholic University of Korea; Yera Hur, Hallym University; Junyong In, Dongguk University; Hyun Kang, Chung-Ang University; Jae Hyun Kim, Dankook University; Mi Kyoung Yim, Korea Health Personnel Licensing Examination Institute; Sun Kim, The Catholic University of Korea; Young Ju Kim, Ewha Womans University; Dong Kyu Lee, Dongguk University; Keumho Lee, Korea Institute for Research in the Behavioral Sciences; Younjae Oh, Hallym University; Janghee Park, Soonchunhyang University; Jeong Yun Park, University of Ulsan; Jungehul Park, Dankook University; Jungkyu Park, Kyungpook National University; Kyung Hye Park, Yonsei University; Song Yi Park, Dong-A University; Won Kyun Park, Keimyung University; Dong Gi Seo, Hallym University; Ji-Hyun Seo, Gyeongsang National University; Aeree Son, Samyook University; Sanghee Yeo, Kyungpook National University; Hyun Bae Yoon, Seoul National University; Dong-Mi Yoo, The Catholic University of Korea
Tom Huh, a graduate student of the Division of Life Sciences, College of Life Sciences and Biotechnology, Korea University, Seoul, Korea, voluntarily made some abstracts audio recordings.

**What journal policies stressed in 2022**

In the screening process of a submitted manuscript, the fitness of the manuscripts to both aims and scope and style and format will be meticulously checked before dispatching it for
Review. Reviewers or editors cannot determine originality. It is dependent on readers’ experience. Therefore, a review has been focused on scientific integrity. Description according to reporting guidelines is going to be more strictly required. Study design should be elucidated to follow specific reporting guidelines. JEEHP is a non-commercial scholarly journal so the number of published articles is not critical, but scientific integrity is essential. The editorial team and I will do our best to keep this policy in 2022 continuously to save the time of reviewers.

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Authors’ contributions

All the work was done by Sun Huh.

Conflict of interest

Sun Huh has been the editor of the Journal of Educational Evaluation for Health Professions since 2005. Otherwise, no potential conflict of interest relevant to this article was reported.

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None.

Data availability

None.

Acknowledgments

None.

Supplementary materials

Supplement 1. Number of articles of 4 types of metaverse in PubMed by year with search term “(((augmented reality) OR (lifelogging)) OR (mirror world)) OR (virtual reality)” [cited 2022 Jan 8], presented in Fig. 1.

Supplement 2. Total cites of Journal of Educational Evaluation for Health Professions in Crossref metadata, Scopus, and the Web of Science Core Collection (WOS) from 2015 to 2021, presented in Fig. 4.
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https://doi.org/10.3352/jeehp.2021.18.22


17. Huh S. The Journal Citation Indicator has arrived for Emerging Sources Citation Index journals, including the Journal of Educational Evaluation for Health Professions, in June 2021. J Educ Eval

Explanation for figures

Fig. 1. Screenshot of the mock test of computerized adaptive testing of the Korean medical licensing examination in 2021 provided by the Korea Health Personnel Licensing Examination Institute.

Fig. 2. Number of articles of 4 types of metaverse in PubMed by year with search term “((augmented reality) OR (lifelogging)) OR (mirror world)) OR (virtual reality)” [cited 2022 Jan 8].

Fig. 3. Number of articles according to the authors’ country of Journal of Educational Evaluation for Health Professions in 2021.

Fig. 4. Total cites of Journal of Educational Evaluation for Health Professions in Crossref metadata, Scopus, and the Web of Science Core Collection (WOS) from 2015 to 2021.

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