Learning Technology

Publication of
IEEE Computer Society’s
Technical Committee on Learning Technology (TCLT)

Volume 20 Issue 1    ISSN 1438-0625    September 2020

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Call for Articles

The IEEE Technical Committee on Learning Technology (TCLT) has been founded on the premise that emerging technology has the potential to dramatically improve learning. The purpose of this technical committee is to contribute to the field of Learning Technology and to serve the needs of professionals working in this field.

The Bulletin of the Technical Committee on Learning Technology aims to report (1) the up-to-date outcome of the emerging learning technologies, (2) the review of learning technology related books, instruments or reports, (3) the collaboration opportunities of work-in-progress research ideas and projects, and (4) the announcements of the upcoming activities that the learning technology community may interest. It would also serve as a channel to keep everyone aware of Technical Committee’s activities.

The bulletin is calling for articles in the following sections:

- **Emerging Learning Technologies**: an article with up to 8 pages the research outcome of learning technologies, including systems, tools, apps, etc., no theoretical or concept only research would be accepted.
- **Book & Report Reviews**: an article with up to 4 pages.
- **Collaboration Opportunities**: an article with up to 4 pages to talk about the research progress and stage outcome as well as the aspects and needs of looking for collaborations.
- **Event Info & Call for Event Host**: 1 page.

The bulletin articles have to give readers clear idea and vision of the advanced learning technologies with rich and proper figures, screenshots, and diagrams.

For preparing your manuscript, please follow the IEEE guidelines and use the template at [https://ieeauthor.wpengine.com/wp-content/uploads/Transactions-brief-short-or-communications-article-template.doc](https://ieeauthor.wpengine.com/wp-content/uploads/Transactions-brief-short-or-communications-article-template.doc). Please submit your manuscript to tclt-bulletin@ieee.org in Word format with the subject title “Bulletin Submission for [section]” (section indicates which section you would like to submit). All figures should be in high resolution and embedded in the main text.

The bulletin is included in Emerging Sources Citation Index (ESCI). The first decision for the submission is in 28 days.
Editorial

Maiga Chang, Rita Kuo, Ahmed Tiili, Jun Chen Hsieh, Danial Hooshyar, Jerry Chih-Yuan Sun

Bulletin of the Technical Committee on Learning Technology is the publication of the IEEE Technical Committee on Learning Technology. The first issue was published in July 1999 and has delivered most up-to-date information in the advanced learning technology area. The bulletin was temporarily closed in 2017.

IEEE Technical Committee on Learning Technology decided to reform the structure of the bulletin so readers can be aware of not only the latest research progress and outcome but also can get involved in terms of collaborating with others and attending important events this June. The bulletin invites articles submitted to the following four sections:

- Emerging Learning Technologies focusing on the up-to-date outcome of the emerging learning technologies;
- Book & Report Reviews commenting learning technology related books, instruments, and reports;
- Collaboration Opportunities bringing the collaboration opportunities of work-in-progress research ideas and projects; and,
- Event Info & Call for Event Host revealing information of upcoming activities that the learning technology community may interest.

After reviewed by associate editors, five articles were selected to publish in this issue, including one article in Emerging Learning Technologies section, one article in Book & Reviews section, two articles in Collaboration Opportunities section, and one article in Event Info & Call for Event Host section.

The section of Emerging Learning Technologies aims to provide a platform where researchers can share their research outcome offering insights into learning technologies, including systems, tools, apps, etc. The first article included in the current issue is entitled “Can YouTube videos facilitate teaching and learning of STEM subjects in high schools?” by Wilson O. Otchie, Margus Pedaste, Emanuele Bardone, and Irene-Angelica Chounta. This work introduced the use of YouTube STEM videos as effective learning resources for the teaching of science in high schools. The study reviewed previous studies and conducted an empirical study with selected Estonian high school teachers. Results show that YouTube videos are considered interactive and effective tools for STEM teaching and learning.

The second article is in the Book & Report Review section done by Xiaojing Weng, Morris S. Y. Jong, and Thomas K. F. Chiu. This report reviews the content of a book, entitled “Smart Learning Environments” published by Springer in its Lecture Notes in Educational Technology, and discusses the interconnection between the chapters of the book. It provides readers with a concise and brief summary of the book, a critical assessment of the content, as well as some suggestions. More explicitly, while multiple parts of the book have been highlighted as exemplary in its knowledge, judgments, or organization, some obstacles and challenges have also been underlined. According to the review, the book offers significant insights for both the educational technology development and technology-assisted pedagogical design in multi-disciplinary domains. Author’s thoughts and reflection on the book are also provided.

In the Collaboration Section, two articles were published in this issue. Tisoglu Secil and Mercielli Murat in the third article, “From traditional to open learning: digital transformation project”, proposed a project that aims to enhance rural education in Turkey by harnessing the characteristics of Open Educational Resources (OER). Particularly, their project has two phases, namely (1) develop policies and strategies related to the faculty members’ lack of digital literacy skills and lack of experiments in online learning environments; and, (2) improve the faculty members’ knowledge and experiences on open education and the ways of implementing open educational practices. At the end, they highlighted the needs for different collaborations in order to further advance the outcomes of their project, such as collaborate in a community of sharing practices, to reflect on new designs and to create an online environment on specific subject matters.

Fahriye Altinay, Zehra Altinay, Cengiz Hakan Aydin, Mehmet Altinay, Gökmen Dagli, and Mustafa Ozhan Kalac in the fourth article, “Networking and Collaboration in Service Quality for a Smart University and Society”, proposed an on-going project to enhance the quality and accessibility of education in general and inclusive education in particular. In line with this goal, several activities have been conducted, including producing instructional videos for teachers on how to develop quality courses, as well as increase the accessibility of the published online resources. At the end, they called for more collaborations in this project related, for instance, to the use of learning analytics in order to analyze learners’ online learning data and enhance the provided learning process and services.

As the world suffers from the Covid-19 pandemic, so do the academic events around the globe. Yet, the academia is not limited by the plight of such a disease. With conferences turning virtual, researchers as well as educational practitioners still have full access to in-depth communication and interaction. The last article written by the bulletin’s associate editor Jun Chen Hsieh introducing the 28th International Conference on Computers in Education (ICCE 2020, https://icce2020.apsce.net/) which is organized by the Asia-Pacific Society for Computers in Education (APSCIE, https://www.apsce.net/) and will be held as a virtual conference this year during 23-27 November 2020. Featuring keynote speeches, theme-based invited speeches, expert panels, seven interrelated theme-based sub-conferences, Workshops, Work-in-Progress Posters (WIPP), Doctoral Student Consortia (DSC), and Early Career Workshop (ECW), ICCE 2020 this year provides a virtual channel through which international research communities could interact and share ideas for research in the field of computers in education.

The current submission statistics, since the bulletin is resumed, show that authors get the first decision notification in 28 days in average and get the acceptance notification in 41 days. The articles have taken 65 days from submitted to publish.

A new section – Report from Developing Countries and Small Island Developing States – will start calling for article in short. The
section is aiming to reveal the status of how learning technologies can help developing countries/small island developing states. The editorial board is looking forward to receive more submissions to these five sections in order to build the platform for bringing the up-to-date learning technology research, outcome, applications, and needs in every corners of the world to the community.
Can YouTube videos facilitate teaching and learning of STEM subjects in high schools?

Wilson O. Otchie, Margus Pedaste, Emanuele Bardone, and Irene-Angelica Chounta.

Abstract—Science is a body of knowledge that explains the phenomena of our world through observations and experimentation. Many nations have developed because of the attention they give, and the investment they put into science education. However, globally, students' interest in science tends to wane and so is a drop in their numbers as they transition from elementary to secondary schools. Many factors were associated with the cause in the drop of students' numbers and interest. Since observations and experiments are the fundamentals in science teaching, we propose the use of YouTube STEM videos as effective learning resources for the teaching of science in high schools. This approach could potentially help to bridge the gap between theory and practice and likewise help to reverse the perception about science. For instance, YouTube STEM videos could motivate students, especially those in the underprivileged schools that lack the basic science resources to take up science programs. The study reviewed previous studies and conducted an empirical study with selected Estonian high school teachers to have their perspectives and insights into using YouTube videos to teach STEM subjects. Interviews with open-ended questions were administered to participants to have their perspectives and insights on teaching STEM lessons with YouTube videos. Results show that all participating teachers find YouTube videos more interactive and effective for STEM teaching and learning. Hence, the increase in the frequency of its use in teaching.

Index Terms—High schools, STEM, STEM teachers’ perspectives, YouTube STEM videos.

I. INTRODUCTION

The advancement in technology and the surge in appetite for digital devices as a way of life have turned 21st-century education into a melting pot of the technological ecosystem. This makes the current generation of high school students more dependent on digital resources and up-to-date information. Hence, a big challenge to science, technology, engineering, and math (STEM) teachers. For instance, they are expected to use this variety of digital resources to meet the expectations of their students. Nonetheless, this is not the case. Students’ interest in STEM subjects is dwindling and the reasons are not far-fetched.

STEM subjects consist of but not limited to Biology, Chemistry, Physics, and Math. These are more practical and inquiry-based subjects that are mostly taught with activities such as observations and experiments. Experiments help students to interact with scientific tools and natural resources to enable them to understand and develop a positive relationship with their environment. That said, the teaching of STEM subjects - like Physics, Chemistry, Biology, and Math - in high schools is perceived to be more driven by concepts and theories rather than activities and experiments [1]. Since the last two decades, this problem has potentially led to a persistent drop in students’ numbers and interest in STEM programs particularly as they transition from elementary to high school education [2], [3], [4].

Most teachers are still using the traditional method of teaching STEM subjects, which is more of a teacher-centered approach, thus making the subjects more abstract and less interactive [5], [6], [7].

The lack of science laboratories and resources in most schools in addition to the cost to train STEM teachers which many schools could not afford [8] cannot be underestimated. From the student’s perspectives, STEM teaching lacks the most practical components, thus focusing more on concepts and theories [9]. Others are uncertain and reserved especially when it comes to working with corrosive acids and other dangerous chemicals. According to them, only the sight of living or dead animals are enough grounds to develop disaffection for the subject [8]. Besides, students’ lack of interest in STEM subjects stems from the fact that most topics are not so relevant and applicable to students’ real-life and social environment [10]. Others claim STEM-related professions are seen to be challenging but earnings are relatively low [11].

Currently, the focus on education is gradually shifting from the previous acquisition of knowledge to a more practical and realistic approach through critical thinking. Besides, STEM-related jobs are now technologically and skills-driven, and this could be a wake-up call to STEM teachers to scale-up their teaching skills. This development necessitates a departure from the traditional methods of teaching STEM subjects to a more pragmatic and interactive one that could equip the STEM student with the skills necessary for them for the future job market. In this day and age, there is a repertoire of technology tools at the disposal of STEM teachers that could potentially augment conventional STEM experiments, thus enhancing teaching and learning. Computer-assisted learning (CAL), virtual reality (VR) and augmented reality (AR) technology, wikis, blogs, and social media sites like Facebook, Twitter, and YouTube are innovative tools that could potentially enhance the work of teachers and engage and motivate contemporary STEM students to learn.

The rationale for conducting this study is the fact that there is a continues decrease in the number of STEM students globally due to the reasons mentioned earlier. Similar concerns in the approach of teaching science lessons were identified in Estonian science teachers [6]. Most research theories have established that learning becomes more effective when pictures are introduced [12], [13]. Consequently, YouTube, a social media app, has the affordances that could potentially address this problem. The study, therefore, looks at how YouTube videos could be integrated into

Received July 25, 2020, Accepted August 23, 2020, Published online September 30, 2020.

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teaching STEM subjects in high schools and how teachers could maximize it's impacts in the teaching process. As an interactive social media tool, YouTube has affordances that could potentially transform it into an effective pedagogical tool for teaching including STEM subjects. Launched in 2005, YouTube usage has soared and currently has 2 billion active users worldwide [14]. Thus, making it the second most used social media app after Facebook. That said, the purpose of YouTube is for individuals to create and upload video content for sharing. This means all kinds of scientific information and resources could be available for STEM teachers and students in YouTube [15]. Hence, the anxiety among stakeholders to integrate YouTube video as a tool for teaching STEM education [16], [17], [18]. There are studies on learning with videos, thus outlining how YouTube videos could be incorporated into STEM lessons [19]. However, the study tries to find answers to the following research questions.

RQ1: How do teachers use YouTube in teaching STEM?
RQ2: How does YouTube enhance students’ interest in STEM?
RQ3: How often STEM teachers use YouTube videos in their lessons?

II. LITERATURE REVIEW

There is a large volume of published studies describing the role of videos as potentially effective educational tools [26], [27], [28], [29], and YouTube videos form a classical example. As a content-generating social media app, YouTube video has grown in scale and scope to become a house-hold name. Thus, it allows individuals to create, upload, view, and share video contents on its platform, like personal video clips, musical videos, videos on wildlife, marine and terrestrial ecosystems, human anatomy, the Galaxies, the Solar system, etc. [20]. The list is endless. Subsequently, studies have established the effectiveness of multimedia learning [25]. Therefore, videos become potential tools to send messages across and this could also be very effective pedagogically according to literature. For instance, there are many potentials in YouTube apps that makes it a suitable multimedia tool and the preferred platform for politicians, universities, hospitals, NGOs, etc. to propagate their messages remotely to their global audience [20]. In education, using videos as a form of multimedia learning dates back many years in history. For instance, the famous statement by Thomas Edison in 1922 that, “the motion picture is destined to revolutionize our educational system and that in a few years, it will supplant...the use of textbooks” [30] (p. 9), and many other similar interventions that came which ultimately failed to see the light of day (ibidem). According to [30] (p. 17), “most teachers used films infrequently in classrooms.” However, despite these failures, videos are still seen as potential educational tools. For example, YouTube videos are potential e-learning tools, thus allowing teachers and students to create, upload, and share learning materials and resources [31].

There are many studies done on the pedagogical potentials of YouTube [32], [33], [34], [35]. However, not much has been said about how YouTube videos on STEM education could facilitate the distribution of knowledge across multi- and cross-disciplines. For example, climate change topics cut across disciplines, from Biology, Chemistry, Physics, Environmental science, among others. Again, most studies focused on colleges, and little was said about its impact on high school education. Furthermore, a lot of studies focused on students’ perspectives on learning with YouTube videos but little was heard about teachers’ views. It’s also significant to know how YouTube videos are articulated pedagogically and the constraints and challenges if any. Again, it is important to mention that YouTube could be combined with other social media apps like Google Classroom, Facebook, etc. for more effective pedagogical results. [31]. Learning resources such as texts, images, audio, and YouTube video links could be uploaded and shared with students via Google Classroom. Again, a lot of studies on STEM education with YouTube are needed to establish the pedagogical advantages and potential constraints.

For example, a study was conducted by [33], to ascertain the pedagogical impact of learning STEM subjects with YouTube videos. In this study, 385 students from two colleges were asked in a survey to provide their perspectives and insights on the usage and effectiveness of YouTube videos as pedagogical tools in learning biology and chemistry. Results from the study shows that 56% of participating students agreed that YouTube videos were useful and related to topics in Biology and Chemistry. Also, the study found that over 75% of participants always search YouTube for educational content. Cherif and colleagues then concluded that most participants use YouTube videos for educational purposes, however, the study was unable to establish the potentials constraints and challenges students may encounter during the process.

Similarly, [20], surveyed 596 undergraduates US college students who took physics laboratory courses at different levels during their program. They found out that many students do consult YouTube videos to learn about the physics topics they encounter in the classroom. However, they also observed this practice to be more prevalent amongst college students than high school students [20].

According to a more recent study by [16], YouTube videos were used for teaching and learning of Chemistry in a high school. A quasi-experiment was conducted on two groups of participating students: Experimental (n=47) and control groups (n=60) respectively. This study, based on investigating the effectiveness of introducing open-source YouTube videos in the teaching and learning of Group Properties, a topic in Chemistry. After conducting a pretest and post-test protocols, it was found out that 1) at the pretest, the experimental group recorded 12% while the control group had 5% score and 2) during the post-test, the experimental group recorded 25% performance in learning with YouTube videos and control group recorded 5%. Therefore, the performance of the experimental group was doubled between the pre and post-test while the control group score remained unchanged. Nevertheless, the pass rate differences between the groups were only statistically significant for the post-test (p = 0.001) [16]. Again this further demonstrates the pedagogical potentials of using YouTube videos as tools during STEM lessons.

A. Theoretical perspectives of multimedia learning

Many claims continue to emerge about the potential use of multimedia tools in education. But how can we accept these claims to avoid repeating past mistakes? The solution is not far-fetched. A rational explanation is by using instructional techniques that are grounded in research-based theory. The study delves into Mayer’s cognitive theory of multimedia learning as the lens to have a world view on this subject. Historically, Mayer’s concept had its origin from Paivio, Sweller, and others who had established the importance of multimedia in learning [20], [21], [22], [23], [24].

According to Mayer’s cognitive theory of multimedia learning, “people learn more deeply from words and pictures than from words alone” [25]. This forms the origin for Mayer’s theory which suggests three key protocols when it comes to learning with multimedia:

1. There exist two distinct channels when it comes to information processing. Thus, the auditory and visual channel otherwise called Dual-Coding theory;
2. Each of the channels has a limited capacity (similar to Cognitive Load);
3. Learning is a practice that filters, selects, organizes, and
integrates information based on previous knowledge.

To Mayer, humans can only process a limited amount of information at a time as they create mental pictures to make the incoming information more meaningful. Also, Mayer recognizes the three memory stores and their distinct and coordinated roles. Thus, sensory memory receiving, and temporarily storing information which is then transferred to working memory, for onward processing and creation of concepts. This is later sent to the long-term memory for permanent storage. Mayer’s concept brings to the fore the fact that the brain cannot interpret multimedia presentations like texts, pictures, audio information in an equally selected form, instead, these are selected and structured to produce more consistent, coherent, and rational mental concepts. Mayer’s theory in addition to others lays a firm premise to our choice of using YouTube videos as potential tools for the teaching and learning of STEM subjects in high schools.

III. METHODS

The use of qualitative study is a well-established approach in giving a descriptive account [36],[37],[38] from interviews conducted between May-September, 2019 with selected high school teachers in Estonia. The benefit of this approach is that it addresses the how and why research questions and enables a deeper understanding of experiences, phenomena, and context [39].

We chose Estonian teachers as participants because in Estonia there is high penetration, appreciation, and use of the internet and other digital platforms among the Estonian population [6]. The study employed a purposive sampling protocol [40], thus targeting high school teachers with experience in teaching with YouTube videos to share their insights and perspectives on the digital resource. After a series of email correspondence, detailing to teachers the purpose of the study, 11 teachers eventually agreed to participate in the study. Thus, they voluntarily signed the consent forms accordingly. In terms of profile, all the 11 teachers (91% =female) have had between 2-35 years’ experience of teaching and 2-8 years of using YouTube as a teaching tool (see Table 1). Semi-structured interviews with open-ended questionnaires were administered [40]. This was conducted remotely via Zoom and lasted between 25-40 minutes. The video transcripts were transcribed into textual format. Inductive coding was used to create categories and sub-categories from the texts to address the following overarching questions. 1. How do teachers use YouTube in teaching STEM? 2. How does YouTube enhance students’ interest in STEM? and 3. How often STEM teachers use YouTube videos in their lessons?

Table 2 illustrates teaching as a category and meaningful use as a sub-category. There are also some excerpts from the interview with participants that focused on interaction, information, and access as outcomes of teaching and learning with YouTube.

<table>
<thead>
<tr>
<th>Category</th>
<th>Sub-Category</th>
<th>Result</th>
<th>Excerpts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching</td>
<td>Meaningful</td>
<td>Interaction</td>
<td>“.... My students watch a YouTube video to see how the bonds in the double-helical structure of DNA are formed …very interactive, interesting and revealing” (PT003).</td>
</tr>
<tr>
<td></td>
<td>use</td>
<td>Access</td>
<td>“.....the students watch YouTube video during a lesson to hear how some scientific words in Biology are correctly pronounced” (PT006)</td>
</tr>
<tr>
<td></td>
<td>Result</td>
<td>Information</td>
<td>“... students can search for information with YouTube so quickly to do their assignments” (PT0010)</td>
</tr>
</tbody>
</table>

Table 3 shows an overview of learning affordances on YouTube. Learning affordances and flexibility to learn are codes for category and sub-category respectively. Excerpts from the interview were cited which resulted in outcomes like availability of teaching notes, more student activity among others.

<table>
<thead>
<tr>
<th>Category</th>
<th>Sub-Category</th>
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<tbody>
<tr>
<td>Learning</td>
<td>Flexibility</td>
<td>Availability</td>
<td>“...when a student misses my lesson or cannot understand, he can go to check at home or watch the video what others have done and do it later” (PT009).</td>
</tr>
<tr>
<td>affordances</td>
<td>to learn</td>
<td>of teaching</td>
<td>notes</td>
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<tr>
<td>Availability</td>
<td>notes</td>
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</tbody>
</table>

IV. RESULTS

The study looks at how YouTube videos could be integrated into teaching STEM subjects in high schools and how it impacts teaching. As an interactive social media tool, YouTube has some affordances that could potentially transform it into an effective pedagogical tool for teaching including STEM subjects. The video transcripts were transcribed into textual format. Inductive coding was used to create categories and sub-categories from the texts to address the following overarching questions. 1. How do teachers use YouTube in teaching STEM? 2. How does YouTube enhance students’ interest in STEM? and 3. How often STEM teachers use YouTube videos in their lessons?

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TABLE I

<table>
<thead>
<tr>
<th>Participant ID</th>
<th>Sex</th>
<th>Years of teaching</th>
<th>Years of using YouTube</th>
<th>Subject</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>PT001</td>
<td>Female</td>
<td>15</td>
<td>08</td>
<td>Math</td>
<td>9</td>
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<tr>
<td>PT002</td>
<td>Female</td>
<td>11</td>
<td>07</td>
<td>Arts</td>
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<td>08</td>
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<td>Female</td>
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<td>04</td>
<td>English</td>
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<td>02</td>
<td>English</td>
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<tr>
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<td>16</td>
<td>05</td>
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<td>25</td>
<td>10</td>
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<td>9</td>
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<td>PT008</td>
<td>Female</td>
<td>20</td>
<td>07</td>
<td>English</td>
<td>7.8</td>
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<tr>
<td>PT009</td>
<td>Male</td>
<td>35</td>
<td>08</td>
<td>Physics</td>
<td>8.9</td>
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<tr>
<td>PT0010</td>
<td>Female</td>
<td>10</td>
<td>08</td>
<td>Biology</td>
<td>8.9</td>
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<tr>
<td>PT0011</td>
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TABLE II

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<th>Excerpts</th>
</tr>
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<tr>
<td>Learning affordances</td>
<td>Flexibility to learn</td>
<td>Availability of teaching notes</td>
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</tr>
</tbody>
</table>
first research question, here is what one participant said, “I select for example a short YouTube video on the Solar System during a Physics lesson which the students observe how the planets revolve around the Sun……and then they answer a list of questions in their workbooks” (PT009). Similarly, a teacher could pause the video intermittently and explain the process or even ask the students to reflect and comment. In the case of STEM subjects, videos can play a very critical role. For example, apart from visual clarity, videos provide the opportunity for the student to see how for example chemical and physical reactions in Chemistry occur or view the process of a life cycle of a plant or an animal in a Biology lesson. This however makes STEM lessons very interactive, interesting, and more realistic. For example, drawing and labeling of scientific equipment, living things, physical or chemical processes, etc. which takes a lot of the study time has now been replaced with videos. Teachers can now focus more on supervision, explanation, and assessment.

Furthermore, YouTube videos on scientific experiments could be used to complement the traditional hands-on approach. Thus, fewer resources will be used. For example, no broken glassware, no chemicals will be spilled or used and no fear for a potential accident. A video on the forest or marine ecosystem could be so graphic that there is no need to embark on an ecological trip with the students. The life cycle of the dangerous animals like the lion, cobra, etc. could be watched remotely. Thus, eliminating the potential fear factor. Notwithstanding, students have the opportunity to watch these videos again when they get home.

The second question in this research was to ask teachers how YouTube videos enhance students’ interest in STEM subjects. Essentially, YouTube videos make it possible to create virtual classes for students across remote locations. For example, YouTube videos of STEM experiments in Chemistry, Biology or Physics could be screened in classrooms, thus removing potential risks and any fear a few students may entertain for traditional science experiments. For example, accidentally spilling corrosive acids or breaking glassware or even encountering live reptiles, amphibians, caterpillar, etc. [8]. This provides more potential benefits to students than the traditional face-to-face or “brick and mortar” approach to teaching and learning. Consequently, it becomes possible for learning to take place in a virtual environment which we describe as e-learning. YouTube STEM videos could augment many science practical lessons especially those schools in underserved communities that lack the needed scientific resources. Furthermore, the interactive nature of these resources potentially places the students at the center of learning. Thus, the students become active participants in the learning process as they actively construct learning in a way as espoused in the constructivists’ school of thought. According to one participant, “…you can use the latest materials. So today instead of a textbook, I would look at the Notre Dame fire because it happened yesterday” (PT006). This provides students with current information that most textbooks lack.

The last question for the study was to determine how often teachers use YouTube videos during their lessons. Table 4 emerges as the category that illustrates the frequency teachers use YouTube videos in their lessons. During the interview, it was discovered that almost all teachers use YouTube videos more frequently in their lessons. Besides, this was not consistent with previous studies where teachers use social media relatively less for teaching, learning, and research [43]. However, it was noted that all participants depend on YouTube videos for most lessons, but others combine it with Facebook, Google classroom, and their school’s learning

### V. DISCUSSIONS

Several reports have shown that YouTube videos, particularly on STEM topics have pedagogical significance and could potentially be tools for teaching and learning purposes. An initial objective of the study was to understand how high school teachers use YouTube videos to teach STEM lessons and their pedagogical impact. Notwithstanding the reviews done, we made a content analysis to have some insights and perspectives about teachers’ pedagogical encounters with YouTube videos. Recorded video transcripts from the 11 participating teachers were transcribed and inductively coded into categories to enable us to answer the overarching research questions.

The first question in this study sought to determine how teachers use YouTube videos in their lessons. Essentially, teaching with videos does not only make teaching interesting and interactive, it as well enhances learners’ understanding [25]. To teach a lesson with YouTube videos, the teacher must develop a positive attitude with technology, thus making this study consistent with previous studies [41], [42]. A positive attitude motivates the teacher to create or search for videos that have relevant and accurate pedagogical information on that lesson. Besides, the videos must be short to improve students’ concentration and learning [29]. Concerning the

<table>
<thead>
<tr>
<th>Interaction</th>
<th>More student activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access and variety of learning materials</td>
<td>“…the fact that more students contribute in the lesson” (PT001).</td>
</tr>
<tr>
<td>Current learning resources</td>
<td>“There are many good YouTube videos on Math” (PT007).</td>
</tr>
<tr>
<td></td>
<td>“…you can use the latest materials. So today instead of a textbook, I would look at the Notre Dame fire because it happened yesterday” (PT006).</td>
</tr>
</tbody>
</table>

Table 4 provides the results obtained from the frequency of teaching with YouTube. All participants interviewed confirm using YouTube videos more often in their lessons. Again, supporting the pedagogical relevance of using it in teaching and learning.

### TABLE IV

<table>
<thead>
<tr>
<th>Category</th>
<th>Sub-Category</th>
<th>Tool</th>
<th>Excerpts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of use</td>
<td>Classroom</td>
<td>YouTube</td>
<td>“I use Ted-Ed YouTube videos a lot in class.” (PT001).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Facebook</td>
<td>“I use YouTube in all my lessons. It has a lot of good videos” (PT006).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>YouTube</td>
<td>“I use SM (YouTube) every day in my lessons because the videos give different perspectives” (PT003).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Google Classroom (GC), YouTube</td>
<td>I share YouTube video links to my students using google classroom” (PT007).</td>
</tr>
</tbody>
</table>

Concerning the
management systems. Subsequently, they use it daily which according to one participant, “YouTube video gives them different perspectives” (PT003). Thus, making their teaching more innovative and interactive. However, one participant uses YouTube only when he finds it necessary. According to him not all his lessons require technology. Ultimately, YouTube videos are potential pedagogical tools which could make teaching and learning more interactive and interesting [16], [19], [33]

Finally, the findings from this study reflect those of previous studies including [16], [19], [33] which also establish that YouTube is a potentially effective pedagogical tool and could enhance the teaching and learning of STEM subjects.

VI. CONCLUSIONS

This study set out to establish the veracity in using YouTube videos as a pedagogical tool for teaching in high schools. One of the more significant findings to emerge from this study is that teachers could use YouTube videos on STEM topics to make teaching more realistic, interactive, and relevant to the needs of the student. This could potentially motivate more students to take up science. Certainly, the study establishes that YouTube videos have come to stay. Hence, many teachers have seen it as a tool that could potentially bridge the learning gap, thus promoting better and effective teaching and learning. Many studies have confirmed the potential pedagogical potentials in YouTube. Subsequently, STEM subjects have been experiencing lower students’ enrolment due to a cocktail of reasons mentioned. That said, it’s time educational stakeholders speak with one voice on the issue of technology integration in the high school curriculum. YouTube integration into teaching could potentially reverse the tide and motivate more students to turn to STEM courses. The study recommends that, teaching science lessons using YouTube videos could help those deprived schools without the requisite science resources. Again, further studies should focus more on how high school teachers and other stakeholders could create video version of the practical topics in the science textbooks going forward. It cannot be said that this study was conducted without any constraints. Our choice of English as the language for the study was one major constraint to getting more teachers to participate in the study because most teachers would have preferred the interview in Estonian which is predominantly spoken.

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Smart Learning Environments - Lecture Notes in Educational Technology
(Book review)

Xiaojing Weng, Morris S.Y. Jong, and Thomas K.F. Chiu

Abstract—The technological advancements and educational changes in the new era have made educational technology a popular research topic. Particularly, the topic of smart learning environments is attracting the attention of educational researchers. While the feasibility and effectiveness of smart learning environments have been popularly explored, there is a crucial need to further gain in-depth understandings of designing, implementing, and evaluating smart learning environments in the 21st century educational contexts. Smart Learning Environments - Lecture Notes in Educational Technology is a book that collects research examples related to the learning, pedagogical, and technological aspects of digital learning applications. It gathers a variety of empirical evidence on smart learning environments and presents the ways of how technological products are adopted in various educational contexts to facilitate learning. The book provides significant insights for both the educational technology development and technology-assisted pedagogical design in multi-disciplinary domains. Furthermore, it helps readers to critically reflect on different smart learning approaches. In this article, we will review the content of the book and discuss the interconnection between the chapters therein.

Index Terms—Smart learning environments, educational technology, learning analytics, ambient design, pedagogy, book review

I. INTRODUCTION

Smart technologies are generally characterized by certain features, including being intelligent and innovative, providing knowledge support, assisting users in accomplishing difficult tasks, and giving appropriate and effective responses [1]. In the book entitled Smart Learning Environments - Lecture Notes in Educational Technology edited by Maiga Chang and Yanyan Li, the term “smart” has been adopted to modify different learning environments. A smart learning environment refers to a technology-enhanced learning environment [2], featured with knowledge, task support, learner sensitivity, context-sensitivity, reflection, and feedback [1].

It is necessary to understand different users’ perspectives while designing smart learning environments [3]. For instance, teachers commented on digital applications from a pedagogical view (e.g., Chapter 5, Chapter 8, and Chapter 11), while students reflected on their learning experience or performance with educational technologies (e.g., Chapter 2, Chapter 7, Chapter 10, and Chapter 11). This book aims to “gather the newest research results of smart learning environments” and “provide readers with evidence and experiments that account for users’ experiences and perceptions related to knowledge and concepts acquisition through these smart learning approaches” [4].

II. BOOK OVERVIEW

The content arrangement of the chapters is well balanced. It begins with a foreword by Alfred Essa and a preface by the two editors on the themes of the chapters. The significance of smart learning environments and its applications in learning analytics, ambient design, and smart pedagogy have been stressed. The book is then organized into three parts with eleven chapters in total. Each part of the book includes quality and independent studies. Generally, the collected studies are informative and innovative, which guides readers to have a better understanding of smart learning environments.

Part 1 is composed of four chapters on the theme of learning analytics in smart learning environments. The corresponding framework (e.g., Chapter 1) and data mining practices (e.g., Chapter 2 to Chapter 4) are illustrated. Modeling is an important mechanism for learning analytics in smart learning environments. For example, Chapter 1 explored how student modeling and context modeling can assist the smart learning system in the recommended courses for students. Chapter 3 and 4 proposed new methods for topic modeling in online learning platforms.

Part 2 includes three chapters on the theme of ambient design. It reports the empirical studies on how different educational technologies (e.g., EagleEye mobile application in Chapter 5 and clicker system in Chapter 7) can facilitate teaching and learning. All such systems can be facilitated by including new resources, researchers yielded some perspectives on the design of smart learning environments. For instance, Chapter 5 mapped out four existing problems in students’ traditional field trip activities and proposed to use digital platforms to solve these problems. Also, Chapter 6 identified the factors and influence effects of notetaking in printed textbooks to provide insights for the notetaking function design of e-textbooks. While Part 2 advocates learning from the past, Part 3 embraces the future of education by addressing on the theme of smart pedagogy in four chapters that discuss a variety of advanced educational technologies, including artificial intelligence (Chapter 8), game design (Chapter 9), virtual environment (Chapter 10), and augmented reality (Chapter 11). The pedagogical feasibilities of these digital learning systems (e.g., to help teachers give feedback, to improve K-12 students’ cognitive skills, and to facilitate senior adults’ fitness training) were tested by different user groups. These studies revealed the unlimited potential of educational technologies to meet wide-ranging learning demands.

III. READING REFLECTIONS

While reading the book, readers will first be impressed by the...
Integrating and Promoting Elementary Pupils’ Learning Motivation in Smart Learning Environments

This book reports not only the positive outcomes of using educational technology, but also honestly discusses the obstacles, so that readers will be given a whole picture of this field. While the adopted technological applications in most of the chapters received positive comments or learning outcomes from their users (e.g., Chapter 2, Chapter 5, and Chapter 7 to Chapter 11), some were perceived unfavorably. For instance, in Chapter 5, EagleEye was not regarded as effective enough for developing student collaboration. In Chapter 7, students achieved a higher cognitive level in the non-digital study group. In Chapter 8, students preferred to use pencils and paper than a computer system while dealing with mathematical problems. In Chapter 11, students regarded that the legibility of the standard AR outperformed the proposed AR X-ray version. By investigating the authentic cases of educational technology development, this book helps readers establish a more comprehensive understanding of the design and application of smart learning environments.

Personalization is one of the common features of most book chapters. For instance, Chapter 1 aims to propose approaches to provide personalized support for learners. Chapter 2 promotes the study of personalized interactions. Chapter 4 takes learners’ individual learning demands into consideration while providing recommendations for them. Chapter 5 designs a learning system for field trips that can facilitate learners’ different time spending preferences. Chapter 6 identifies that students will use personalized symbols in their notetaking. Chapter 8 highlights the significance of teachers to provide personalized feedback for students in the learning management system. Chapter 9 suggests a fitness system to adjust the motion recognition based on users’ individual differences. When students are learning, they tend to absorb information from their own preferred ways, which are decided by their hereditary equipment, life experience and the environment demands [5]. Based on these preference differences, learners can be categorized by different learning styles, such as visual learners, auditory learners, reading/writing learners, and kinesthetic learners [6]. Though there is no one-fit-all instrument for all users, researchers are trying to make the learning environment as smart as possible to serve learners with different needs.

Despite the comprehensive and useful content of this book, readers may come across some difficulties. Firstly, since the book covers a wide spectrum of subjects, readers should expect some challenges when reading something they are not familiar with. For example, the mathematical formulas shown in Chapter 1, 3 and 4 explaining the modeling algorithm of the systems may frustrate readers who do not have relevant knowledge. Readers are advised to grasp the main idea of the chapter instead of understanding it verbatim. Besides, the studies in this book are not at the same quality level. Some of the chapters have weaknesses in their research designs. For instance, the sample sizes of Chapter 9 (n=13) and Chapter 10 (n=18) are relatively small. Nevertheless, the quantitative analysis of these two studies can be a complement to their qualitative investigations, readers can still gain valuable insights from these chapters.

This book provides both theoretical and practical insights for educational researchers, policy makers, teachers, students, technology developers, and the ones who are interested in smart learning environments. New technological applications and tools will emerge over time; however, the theoretical bases and student-centered educational paradigms underpinning the design, implementation and evaluation of various promising constructivist technology-enhanced learning strategies are everlasting [7] [8]. Therefore, this book can always gain readership in educational technology, regardless of the changing environments. In the near future, the editors may consider compiling another book to discuss the new learning and teaching opportunities unleashed by the educational potential of artificial intelligence (e.g., [9]), digital gamification (e.g., [10]), seamless ambiance-awareness (e.g., [11]), mixed reality (e.g., [12]), as well as other web 4.0 and industry 4.0 technologies (e.g., [13]). While this book covers a large number of educational innovations, including LMS, intelligent tutoring systems, game design, virtual environments and augmented reality, the next book can deepen these studies by riding on emerging technologies.

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From traditional to open learning: digital transformation project

Tisoglu Secil and Mericelli Murat

Abstract—This project aims to find solutions for the problems encountered in a rural university which has been struggling to adapt to educational movements and its practices: online learning and open education. The problems have already existed at the university, but the pandemic process made them more visible and critical to address the practices for teaching and learning processes. Therefore, two phases have been developed and will be applied respectively: first to implement strategies considering the faculty members’ lack of digital literacy skills and lack of experiments in online learning environments, and second to enhance faculty members’ knowledge and experience on open education and open educational practices. This new project has not had observable and practical outcomes yet except the series of expeditious trainings applied considering digital literacy. Therefore, we mostly focus on the rationale, purposes, and the structure of the project in this paper. We have also outlined the phases of the project, which have also inner cycles and approaches, as well as the collaborators we seek to share the experiences and visions.

Index Terms—blended learning, digital literacy, open education, open educational resources,

I. INTRODUCTION

The delivery of instruction has been shaped by the technological developments and new perspectives of educational practices for years. E-learning and evolving open learning approaches bring new practices on how to integrate technology into educational contexts. In Turkey, e-learning and blended learning are not new terms that some institutions have been practicing it by offering for some courses and degrees. However, many institutions prefer still practically to apply traditional approaches including face-to-face instruction. On the other hand, open education and open learning are considerably new ideas for educational system in Turkey. The first organizational attempt to develop open educational resources (OER) through OpenCourseWare (OCW) system was established in 2007 by the Turkish Academy of Sciences, with a consortium of 34 universities [1],[3]. Also, some projects and researches have been practiced regarding open education related terms: open access, open license and OER. Up to now, besides the institutions’ few open courseware systems and online systems, two initiatives have evolved during the Covid-19 pandemic process: Ministry of Education’s (MOE) EBA project and Higher Education Council’s (HEC) national repository movement. EBA is a project run by MOE at the K-12 level. On EBA, students can access the contents of their classes with their username and password. Some materials have also been offered as open access (http://www.eba.gov.tr/). On the other hand, HEC’s national repository functions as a national directory which collects the courses provided by the universities at their OCW or online systems. Beside the limited number of openly shared courses and resources, this repository has not reached its full potential for each discipline yet (https://vokdersleri.yok.gov.tr/).

During the pandemic process, all institutions have been experiencing a new platform of e-learning and faced many challenges considering online learning components. In this project, the researchers will investigate the current situation at a public rural university located in the north region of Turkey and provide a roadmap to address the problems. The university offers undergraduate and graduate degree through bachelor, master, and doctoral programs and preserves 13 faculties, 3 colleges, and 13 vocational schools. This project will be applied in Faculty of Education to enable faculty members to create a more personalized, flexible, and open learning environments. In the Faculty of Education, the delivery of instruction is highly traditional, and the online practices are limited to the personal attempts of faculty members who use different methods of teaching. Until the pandemic process, the university had not offered a Learning Management System (LMS), therefore, the ALMS were first introduced to institution at the beginning of this process (This system was established but the integration had not been completed before the pandemic process). Therefore, the institution has faced many challenges to adapt to online learning environment considering the lack of knowledge, skills, motivation, and experience.

In this project, we have applied a problem-based approach which focuses on the design process to address the problems. This study also embraces a pragmatic perspective to combine the best theory, concept, or mode of instruction to follow [2]. This iterative process will enable the researchers to gather a holistic approach to solve the problems which are defined as below:

- Problem I: Faculty members’ lack of adaptability to blended or online learning environment
  Related problem: Lack of knowledge about digital literacy
- Problem II: Lack of shared practices and resources on specific courses
  Related Problem: Lack of knowledge about open education and open educational resources

Based on the problems, two phases of the design process will be followed, respectively. These phases are considered iterative to find the best solutions for the problems identified in this project. Hereafter, the solutions are preferred to mention as strategies because solutions may refer to complete and apparent applications which could limit the researchers to find several approaches to address the problems. Therefore, some strategies will be developed during the phases of the study. Alongside the phases, some organizational strategies will be implemented to organize the programs and to provide support mechanisms (Staff Development Unit) as well to enable open educational practices (OCW, open directory). Figure 1 shows how the project will be held considering the strategies and the organizational applications for the problems in the system.
A. Phase I:

The first phase of the project mainly focuses on Problem I enhancing faculty members’ capacity of digital literacy skills and increasing their adaptability to blended learning environment by including a series of training sessions. During the pandemic process of Covid-19, the experiences of faculty members showed that some faculty members struggled to adapt to e-learning system, precisely to the institutions new ALMS system and its technical assets. To add, first problem addresses the lack of faculty members’ digital literacy skills that few of those were practically equipped to transform their courses to an online learning environment. Most of the resources used in traditional classroom are not online or diverse regarding the type of online resources. Therefore, the primary purpose of this phase is to enhance faculty members’ digital literacy skills and their effective use of online systems available at the institution. However, their limited practices in online learning environment could influence their adaptability to create online resources and their sharing practices, so that blended learning as a curriculum strategy will be presented to improve the current practices in online learning environments. Rather than a complete e-learning design, blended learning will be presented as a compatible strategy for traditional learning to revise the current curriculum strategies and to integrate the technology into curriculum design. This phase consists of developing online instructive trainings, online courses, and workshops. Online instructive training mostly focuses on hard skills for developing technical skills in a specific context that the trainings will provide the technical details and usability of institutions’ online systems. Most instructive resources have been presented so far related with the use of ALMS system, but future trainings will be developed for the use of OCW and directory system. For creating online resources, a series of online courses will be implemented. At the beginning of this process, a discussion-oriented workshop will be applied to reflect on the current resources used and future subject-specific online resources. These initial workshops will be developed for each department which shaped the selection of the resources. For blended learning, an online course will be developed to present the details and affordances of blended learning. This course encompasses the foundation, pedagogic approaches, and sample applications of blended learning used in
current educational settings. This initial course aims to raise awareness about blended learning and to reflect on current practices in formal education settings. A series of workshops will follow to undertake an interactive environment for faculty members to design their courses by deciding on what level and format they will choose to blend their curriculum. In a nutshell, these training sessions are aimed to display how to transform the traditional courses into blended learning environments. However, this process does not hold the aims of convincing faculty members to apply blended learning approach, rather it is an informative process to show different modes of delivery, their affordances and effects on learning environments. Precisely, it is a step for faculty members to engage in online environments and to explore new advancements in educational applications.

B. Phase II:

The second problem raised from the pandemic process is related with the lack of knowledge about the license issues, lack of shared practices and resources in online community. In accordance with the lack of digital literacy skills and limited number of online resources, faculty members also struggle to transform their current resources into online learning environments. In traditional classrooms, the closed-community may bring conformity for faculty members not to care about the resources’ quality and copyright issues. Thus, the limited online presence (in here, the presence is only located in the institutions’ ALMS) displayed faculty members’ concerns about the quality and the content of the resources and the lack of knowledge on copyright issues. Until the pandemic process, personal attempts had been implemented by some faculty members to share their online resources and course components by using self-moodle systems (Google Classroom, Edmodo, etc.), however, these platforms have also provided a closed-community for faculty members and students. To add, the attempt of HEC shows a lack of shared, qualified, and subject-specific resources and courses for faculty members to revise their current approaches. Therefore, the second cycle of the project is trying to present a new path for faculty members to be a more collaborative, open and reflective on their teaching practices by interacting with the community of learners, instructors, educators, policymakers, administrators. For this cycle, the underpinnings of open education and strategies for integration of open educational practices to teaching and learning processes will be presented. A series of seminars will be conducted about the open education, its affordances, and the nature and purpose of education from the perspective of sharing culture. Sharing culture and open license requires more action to take so that a workshop will be conducted to present open licenses (Creative Commons) and how to publish the resources aligned with the open licenses. Online presence is also an important issue to take into consideration that the faculty members’ personal or academic presence in online platforms could influence their adaptation to the online environment and sharing practices. Thus, this issue is not a primary focus, but it will be presented under the sharing practices. At the end, focus group discussions and workshops will be developed for faculty members to engage in collaborative activities. This process focuses on how to transform their prevailing activities through the lens of open education by following the OER-enabled pedagogy [4]. This OER oriented pedagogy fits well with the project’s purposes and the researchers’ roadmap for open education. This pedagogy presents many strategies and scenarios to integrate the online resources into the curriculum and to share them under open licenses. Discipline-oriented workshops will be applied for faculty members to reflect, critique, design and revise their courses and resources, and to share their practices with the members of the community. Alongside with this phase, an OCW platform which enables faculty members to share their course process and materials, and an institutional directory to locate different OERs and online resources for different disciplines will be established. OCW platform will be connected to ALMS for faculty members who prefer to share their course resources under open license.

The university does not have a unit for staff development and guidance for teaching and learning practices. Therefore, there is a need for a unit which encompasses instructional technologist, librarian, subject specialist, and technical specialist to organize and develop online courses, seminars, and workshops. This unit could also offer support and guidance for faculty members to adopt the new practices (blended learning and open learning) and to apply practices and strategies (sharing, creative commons license, online resource creation, the usability of online platforms). These initial strategies enable the researchers to design the project, to solve the problems specific to this case and to consider the elements for the solutions of the problems: knowledge, resources, and motivation [2]. Therefore, the strategies will cover the practices, concepts, and applications which will best address the problems in this case.

II. Research Achievement and Outcomes

In this project, the initial observation and experiences emerged during the pandemic process, however, before that process, the institutions’ culture and practices about the online learning environment were limited to follow a traditional-oriented approach. Therefore, the problems explored were also valid in advance, but the pandemic process made the problems more visible for faculty members, administrators, and policymakers. The researchers’ primary aim is to develop an open culture to create interactive, collaborative, and accessible learning environment but the prevailing culture at the university indicates critical deductions that the faculty members have not prepared for open practices yet, rather they firstly need to embrace the pedagogy, approaches, and strategies of online learning to engage in blended learning practices. Therefore, regarding the first problem, institutions’ Distance Education Application and Research Center prepared a series of know-how videos and text-based guidelines for faculty members to practically design some online resources (instructive videos, syllabus, etc.), to prepare online courses (how to prepare an online assessment, how to prepare a YouTube broadcast, etc.), and to use online systems (ALMS, Edmodo, Google Classroom, etc.) and digital tools (OBS, Zoom, FreeConference, etc.). These useful resources were prepared to solve the problems that occurred during the online learning process, and they provided quick solutions to deploy the traditional practices. At the end, majority of faculty members used at least one learning management system (ALMS or other LMS), prepared at least one visual and text-based material for each week, scheduled at least one video conference for meeting with students during the semester, and used online assessment tools and learner-oriented assessment approaches (reports, online portfolios, projects, and online materials). Thus, the outcomes of this process look promising, but some faculty members and students felt uncomfortable in online learning environment which showed minimal interactions between students and faculty during this process. This radical and somewhat compulsory transition might influence faculty members and students’ perceptions towards online learning and negative experiences might alienate them from the new practices (some observations and informal conversations at the institution showed that the students and faculty members wanted to proceed with traditional learning in the future). Therefore, the blended learning and its affordances and practices on educational settings might support more balanced transformations and adaptations to future educational movements. The second phase has not presented any outcome so far, but the
The creation of OCW and the open directory will be carried out alongside the practices in Phase I. The prototype of the system will be tested by some faculty members who are willing to share their resources. Also, the system components will be utilized for the faculty members to easily find the resources through open directory and to share self-resources and courses through OCW. Therefore, ALMS and OCW will be connected for users to easily share their courses located in ALMS via OCW.

III. Future Collaborators

As mentioned above, this project offers a new roadmap to address the problems evolved during the pandemic process, but the essential aim is to offer a more comprehensive framework on how to transform the current practices for those who will be adaptable to a more open, flexible and technology-enhanced educational setting. The researchers are from instructional design discipline and have online and open learning experience but in an institutional context, their experience may not be enough to provide a holistic picture. So that we are looking for collaborators:

- To share their stories about the barriers, and challenges they faced, practical solutions for the problems encountered while adopting OERs.
- To share their experiences, designs, and applications regarding blended learning environments
  - To share their visions about open education and their current practices
  - To collaborate in a community of sharing practices, to reflect on new designs and to create an online environment on specific subject matters

We notably care about the stories and experiences of the experts, designers, and users especially from the rural communities where the resources are limited while engaging in the process of new movements. Each organization, institution, workplace have specific features and solutions for the problems, but we need examples and guidance to face the challenges during the process. Regarding the workshops, the primary aim is to enable faculty members to design their curricular activities, however as open education suggested, the essential part of the design is to be present in online community to share, reflect and revise the product and to build an interactive knowledge transmission between the members of the community. Therefore, especially the faculty members, instructors, educators, and researchers are welcomed to involve in a community with the faculty members at our institution to form an interactive and international environment. As a sample form, Table 1 displays the general strategies, future directions and future collaborations of this project.

<table>
<thead>
<tr>
<th>Problems</th>
<th>Strategies</th>
<th>What have been done so far?</th>
<th>What will be done?</th>
<th>What do we need for collaboration?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem I</td>
<td>Common tasks for using online system components</td>
<td>Instructions for technical assets of ALMS Identify requirements for Moodle LMS as template, database, etc.</td>
<td>Instructions for technical assets of OCW and directory Instructions for sharing course components Online courses will be developed for creating online resources (visual, auditory and interactive materials)</td>
<td>Share experiences at these two headlines. Issues about Moodle accessing permissions, Data Security &amp; Performance Issues</td>
</tr>
<tr>
<td>Problem II</td>
<td>Courses on how to create online resources</td>
<td>Instructions for using some programs and tools (video editing, video shooting, online conferencing, etc.)</td>
<td>Online courses will be developed for creating online resources (visual, auditory and interactive materials)</td>
<td>The experts or the experienced instructors to share their designs, approaches and strategies for blended and e-learning</td>
</tr>
<tr>
<td>Problem III</td>
<td>New designs for Blended Learning</td>
<td>Online courses and workshops to show different approaches, types of content and medium</td>
<td>Experts on open education and OERs to share their experiences and their visions regarding accessible, interactive and accessible information and the place of open education in the future educational practices</td>
<td></td>
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<tr>
<td>Problem IV</td>
<td>Information about Open Education &amp; OER</td>
<td>Seminars about the open education and OER. The current practices and affordances.</td>
<td>Share experiences about copyright issues (May be legal situations)</td>
<td></td>
</tr>
<tr>
<td>Problem V</td>
<td>Practices of Open License &amp; Sharing</td>
<td>Seminars on open licenses Workshops on how to share the resources with these licenses</td>
<td>Share experiences on online presence and provide examples</td>
<td></td>
</tr>
<tr>
<td>Problem VI</td>
<td>Online Presence</td>
<td>Seminars about how to increase the academic presence in online platforms and why we need that</td>
<td>Instructors to collaborate and to share the faculty members’ designs, critical eyes to create a community of practice</td>
<td></td>
</tr>
<tr>
<td>Problem VII</td>
<td>New designs and applications for open educational practices</td>
<td>Focus group discussion &amp; workshops to reflect on current practices, problems, and possible solutions Discipline-oriented workshops which enable to design a new course and to share the practices</td>
<td></td>
<td></td>
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</tbody>
</table>
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Networking and Collaboration in Service Quality for a Smart University and Society

Fahriye Altinay, Zehra Altinay, Cengiz Hakan Aydin, Mehmet Altinay, Gökmen Dagli, Mustafa Ozhan Kalac

Abstract—This reflection report sheds a light on how collaboration among higher education institutions fosters opportunities for the quality improvement in societies. Higher education institutions have a great role to integrate possible emerging services to the societies. They need to collaborate for both personal and professional development. In this reflection report, there are lots of events that were done jointly and these events added a value for the service quality of the higher education institutions. Societal research and development center have conducted many collaborative projects with different institutions in different themes. It was revealed that joint actions enrich the implications for the benefits of societal values and increase the necessity of further collaborations. Besides joint events, reflections on practice and process of professionals provided rational roadmap on service quality. In addition to this, it was revealed that networking and collaborations put an emphasis on quality for establishing smart university and society.

Index Terms—Collaboration, higher education, networking, smart, quality

I. INTRODUCTION

Higher education institutions have crucial roles to fulfill the welfare of the society based on expected needs and problems through scientific projects and attempts. For the societal problems, there is a significant need for collaboration between communities and partners. Considering the social problems within the scientific sense is highly important by the merits of technology as a role of higher education institutions.

The Societal Research and Development Centre, established in Near East University in 2013, continues to emphasize social responsibility awareness through studies and activities on women, children and individuals with disabilities representing the university.

The Center has taken the role of a guide in determining practical needs by conducting a social analysis, with the awareness of team spirit and scientific studies at the basis of research and development. In line with its vision and missions, the Societal Research and Development Centre primarily engaged in activities for the people with disabilities. The mission of the center is to put forward a miracle to raise the rights of citizens with disabilities and learners with emphasizing the role of technology as pathway for solution. This sheds a light to underline the importance of different types of collaborations with different collaborators.

Our connected synergy is to pay attention to disability, sensitivity, equal access and opportunities in education and also for smart society. In our university, we have started to work as a team for disability. This became our milestone to pay attention to collaboration with the different bodies of society. Our aim is to remove barriers by facilitating awareness into the society and educate people to be more sensitive for the rights of human beings. All of joint collaborations rely on the emerging the uses of technology and digitalization for societal and educational values. Every service can be possible regardless for everyone in order to provide service quality in education. Our further collaborations will open a door for synergy as a whole picture in a society.

II. RESEARCH ACHIEVEMENTS AND OUTCOMES

The Societal Research and Development Centre plays an important role in the research and recognition of the research at the University. The vision of the Societal Research and Development Centre is to support conducting high-quality research in line with scientific and technological developments, and adapting to social responsibility. The mission of the Societal Research Centre is to become a centre within the university that carries out social responsibility projects and research services within the framework of inter-university and cooperation with the society. The centre carries out activities in cooperation with many universities and civil organizations especially non-profit organizations for citizens with disabilities. In the context, the Societal Research and Development Centre has carried out the following activities, events and projects since its establishment 2013.

In this respect, center has done cooperation agreement with Manisa Celal Bayar University which undertook the task of Unobstructed Technologies & Barrier Free Communication Information Technologies for Disabled Citizens as platform. Many comprehensive international academic events to improve the rights of people with disabilities in Northern Cyprus has been organized within the scope of these collaborations. Those academic events provided collaboration among institutions and increased awareness on the subject of disability in all fields. As a concrete example, the Societal Research and Development Centre has become a part of the significant event that was organized by the platform of Manisa Celal Bayar University. A comprehensive look into pandemic time for the life of people with disabilities has been examined with scientific

Received July 21, 2020, Accepted August 31, 2020, Published online September 30, 2020.

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cases to propose roadmap for the future. "COVID19 Process and Barrier-Free Informatics Summit" was organized and reflections of the COVID19 process on distance learning and open educational resources were discussed among professionals at different sessions. Due to the many decisions taken at “Barrier-Free Informatics Conferences” which was held in North Cyprus, it has made amendments to the legal regulations for the benefit of the people with disabilities. Before the pandemic times, regular events for the disability and technology were held in Near East University with cooperation of Manisa Celal Bayar University. It is crucial to focus on consideration of the disability and technology as hand by hand where technological facilities are becoming better solution for inclusion, and equal opportunity. University activities pioneered the establishment of the Prime Ministry Disabled Coordination Board and facilitated the lives of the people with disabilities in many areas. Due to the collaborations of the Societal Research and Development Centre and also many activities, it has created serious awareness in the society in Northern Cyprus, and also has both facilitated to set decisions for all ministers in order to take actions to reform the lack of services in the life of the people with disabilities. In one of the event in relation to cooperation with platform in Manisa Celal Bayar University, all representatives of governmental and non-profit organizations became part of the discussions and meetings to set decisions on how upcoming new technologies may affect the future of education, health, transportation, etc. for the social inclusion, life standards of citizens with disabilities. The most significant role of those regular cooperative events with Manisa Celal Bayar University showed how new technologies and cases can be shared for the benefit of all and how cooperation can be enriched among institutions. In all sessions of those events, services for people with disabilities, existing studies, regulations, successful examples and problems in Turkey and in Turkish Republic of Northern Cyprus has been expressed and reported to set recommendations for the future. This shows how universities can collaborate with all institutions and work areas for the benefit and welfare of the society. Accessibility is the main issue for the life of people with disabilities which also need to set collaborative efforts for the solution. Cooperation between the institutions, Accessible Information Days were organized and led up the implementation of legal legislation and practices for people with disabilities in TRNC. Important steps were taken towards sharing experiences and developing forward-looking cooperation with the event organized. Particularly, steps have been taken in order to realize new work areas in TRNC in the fields of "Access of the Deaf, Deaf and Visually Impaired to Broadcast Services", "Web Accessibility" and "Use of Technology in Special Education". Accessibility issue and events also supported and collaborated by Manisa Celal Bayar University.

There is another collaboration example between Societal Research and Development Centre and Anadolu University professional based on research project in the field of distance learning. On a voluntary basis, beside the professional from Anadolu University, more than 11 scholars around the world participated in the project on how to develop knowledge management process in distance education practices which is entitled as “Knowledge Management Process in Higher Education Applications: Intercultural Views to Online Education Practices. Nowadays, it is crucial to reveal the results of the project in pandemic time. In this respect, collaborative efforts, networking are extremely needed for the future of online learning. Internalization of online pedagogy, integrating open education resources policy into practice are crucial significantly in pandemic time. In this context, within the scope of the project, seminars were given in order to analyze the organizational and pedagogical aspects of online education. The themes of seminars are related to knowledge management approach, block chain, online learning and higher education.

Beside the international project, same scholars worked for the module to support the barrier free module for learners with disabilities As a result, the scholars set standards, recommendations on how the families with learners with disabilities can get mentoring and guidance services during their learning process. This provides logical attempts on practice about providing mentoring and guidance services for families through online platforms which could be more confidential, practical and need expectation oriented.

The Societal Research and Development Centre has worked with many projects in accordance with its vision and missions. In this project, in collaboration with international participants, a seminar was held with the participation in science education and its learners and a joint research process was also carried out in order to evaluate Teacher Education in the Field of Natural Sciences Teaching. Another project in cooperation with Maribor University was organized within the scope of the Barrier-Free Campus, Environmental Education and Environmental Protection Project, and a conference on the barrier-free campus "Employment of the Disabled: Human Resources Management for Quality in Higher Education" which was the project of the Societal Research and Development Centre, was also conducted.

It was aimed to create a database of on citizens with disabilities in Northern Cyprus as a result of this project. In addition, suggestions about employment strategies for students with disabilities have also been developed with the project.

Another project of the Societal Research and Development Centre is the "Women as Social Entrepreneurs" project. In this project, collaboration was made with the Research and Development Centre, Tourism Research Centre and Municipalities as a research team. This project included training on entrepreneurship and career planning to help rural women find or create their own jobs.

Moreover, "Women with children with disabilities: Increasing digital literacy skills" project. This project included enhancing digital literacy skills in order to receive educational and psychological counseling services for the children of mothers with disabilities.

In addition to above mentioned projects, "Safe Schools" project was held. In this project, collaboration with the Societal Research and Development Center and the City Security Group was made as a research team. This project included the proposal for a safe school policy for the future. Serious contributions have been made to the field such as school culture, cyber bullying, crisis management, and etc.

Likewise previously mentioned projects cooperative events were held, “Transformation of Teaching and Learning in Higher Education to Open Learning” was also carried out by the center. Effective collaboration has been made with international researchers in the project. This project covered how transformation can be in teaching and learning for open learning in higher education. The research provided forward-looking suggestions and roadmap.

Within the scope of the projects carried out and completed, the Center contributed to the field through the “Preparation for Online Learning: Being a Smart Society” project and the “Current Status of Special Education: Use of Online Education” projects through collaborations with international researchers.

Moreover, "Digital transformation, disability and online learning: higher education applications" project was carried out with the participation of international researchers. Analyses on digital transformation, the role of higher education institutions and practical
solutions for students with disabilities through online learning have been introduced.

Furthermore, another significant project namely is "Analysis of Societies: Transformation, Technology and Education" project was fulfilled. This project was carried out in cooperation with Karadeniz Trabzon University. This project revealed the dimensions of societies to analyze changing trends in technology and education through transformation.

Apart from above mentioned projects, other crucial projects were accomplished with international collaborations by the Center which were “Critical Success Factors in Online Learning: Learning Analytics” and “Sensitivity Education for Non-Governmental Organizations” projects.

The Societal Research and Development Center also organized conferences in cooperation with University of Kyrenia in many fields. “Service for the Community in Social Transformation Workshop” was organized. The workshop focused on recent research and projects on titled the society that participated in life, especially in the social transformation that occurred during the pandemic process we are experiencing today.

In addition, “Barrier-Free Education and Distance Education Panel” was held in cooperation with Near East University Societal Research and Development Center, University of Kyrenia, with the establishment of Arab League Educational, Cultural and Scientific Organization (ALESCO) and Trabzon University. Significant contributions were made on how to improve distance education by focusing on the recent research on the development of disability free education and the possible development of distance education in the pandemic process and afterwards.

“2nd Barrier-Free Tourism and Health Conference” was held in collaboration with the Near East University Center of Excellence, the Societal Research and Development Center, University of Kyrenia, Oxford Brookes University and University of Kyrenia. Tourism and health services for everyone, which took place within the Faculty of Economics and Administrative Sciences at University of Kyrenia, were included in the conference.

A seminar titled 'Society and Children in the Digital Age' was organized in collaboration with Faculty of Education and Psychological Counseling, Guidance Department of University of Kyrenia and Societal Research and Development Center. Subject “The Most Children at Risk in Cyber Bullying” was discussed in the seminar.

In addition, a conference was held to analyze the status of social responsibility and projects within the scope of Community Service Practices in the fields of education and health, in cooperation with the University of Kyrenia and the Societal Research and Development Center. Due to the conference, how students should produce and implement projects in community service practices, which are part of education and training at universities was examined.

In addition to these conferences, “Disabled Tourism and Health” conference was organized in cooperation with the Faculty of Economics and Administrative Sciences, hosted by the Near East University Center of Excellence Societal Research and Development Center and University of Kyrenia,. TRNC Prime Ministry Disabled Services Coordination Board was in cooperation in this event. Due to the conference, the area was supported in order to increase the living standards of the disabled and to ensure full and equal participation in the society.

Any universities and nonprofit organizations, centers from any country are welcome to collaborate in order to expand achieved projects in different contexts.

III. FUTURE COLLABORATIONS

Digitalization has happened and increased the visibility of services of higher education system in the networked society structure. For example, it became clear that people with disabilities are watch and actions rather than become actor of their rights. Because of this dilemma, we have decided to become proactive and make people with disabilities to be actors of their life destinations by making joint collaborations. In this respect, future collaborations will be continued to focus on disability in every aspects of life with the integration of technology and smart conditions. Therefore, nonprofit organizations for disability, experts in accessibility, educators on special education, and experts in online education are welcome to join these collaboration on disability and digitalization in higher education. These joint collaborations will foster a model for a smart university examples.

As we focused on educational development of key actors for making them actors to transform and diffuse universal rights in the society,. We also will continue to establish collaborations with different parties in order to make an adding value for the citizens based on equal access and sharing through online learning activities. These students also enrich their knowledge by participating in many seminars. In this respects, representatives of education ministries, accreditation committees, peace building communities, primary education teachers are welcome to develop cross cultural understanding for universal values and rights in all levels of education. In addition to this, training on online learning activities will be done respectively by international partners to understand different models and experiences.

Online education practices make visibility and create a voice for everyone especially for people with disabilities. In online classes, socialization among other people and disabilities has happened in equal manner. All people become equal based on equal accessibility of information, tolerance and understanding. It is obvious that our students developed their skills and competences in online learning environment. Creativity and entrepreneurship have become keys for people with disabilities, education for all in order to broaden proactive attempts in the society. Continuing education centers, teachers, representatives of education faculties, graduate schools, representatives of ministries, university representatives and also higher education councils are welcome to join this project. These kinds of collaborations will be enriched foster to expand our leadership, and innovative potential. Intellectual capacity, sharing and collaboration skills for the common welfare of the society through the services of higher education institutions for a whole picture within smart societies.

In addition to this, digital transformation, disability and online learning: higher education practices which concentrates on the analysis of digital transformation, the role of higher education institutions and practical solutions for learners with disabilities through online learning will become agenda for joint and comparative studies. Analysis of Societies: Transformation, Technology and Education that fosters the dimensions for societies in analyzing changing trends in technology and education through transformation will be another project for further collaborations. Critical Success Factors in Online Learning: Learning Analytics and analysis of critical friendship will be focus of further collaborations. Experts, instructors, team in distance education centers are welcome to acquire these ideas together. Understanding the different contexts practices will add a value of our context practices. Therefore exchanging ideas, researchers and also professional knowledge will contribute to the development of society and also our center. Future collaborations will be examined to reflect win-win policy of partners
and also societies. Sensitivity Training for Non-Governmental Institutions will be further collaboration ideas to realize the importance of work based learning and digitalization for the welfare of societies. Importance of open education resources and the way of using open education resources in the national context will be examined.

The above explored concrete examples and collaborations with other scholars, institutions will show the connected bones of shared efforts, dialogue and logical pathway for better solutions together. Disability, children and women projects are the scope of societal research and development centre. All the cases that were reflected in collaborative work manner within conducted projects. Based on improvement, scientific meetings and agreed decisions by all authorities in which will become more functional by further collaborations. Further to this, the framework of smart societies with new and accessible technologies for all will be the direction of future education which social presence, inclusion and equal opportunities in all aspects of life are issues need to be undertaken.

REFERENCES

Fahriye Altinay is Director of Graduate School of Educational Sciences and she is Chair of Societal Research and Development Center as a board member in the university and the faculty. Fahriye Altinay is the member of academic journals and she has national and international books, publications, and research projects. Prof. Dr. Fahriye Altinay is member unobstructed information technology platform and actively works in her studies about disability in smart society. Current researches consider the importance of diversity management, sensitivity training, disability, global citizenship for smart society.

Zehra Altinay is Director of Educational Sciences Department and Chair of Societal Research and Development Center at Near East University. She is Vice Director of Graduate School of Educational Sciences. Zehra Altinay is the member of academic journals and she has national and international books, publications and research projects. Zehra Altinay is director of ethical committee in the university and responsible person to care rights of disabled people.

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Assist. Prof. Dr. Mustafa Ozhan Kalac is Chair of Unobstructed Information Technology platform in Turkey. He is working at Manisa Celal Bayar University. His research area is disability, technology.
I. INTRODUCTION

The 28th International Conference on Computers in Education (ICCE 2020, https://icce2020.apsce.net/), organized by the Asia-Pacific Society for Computers in Education (APSCE, https://www.apsce.net/), will be held as a virtual conference on 23-27 November 2020. Since its foundation on 1 January 2004, APSCE has been promoting the conduct and dissemination of scientific research concerning all aspects of computer integration in education, particularly within the Asia-Pacific.

As a meta-conference, ICCE 2020 includes keynote speeches, theme-based invited speeches, expert panels, seven interrelated theme-based sub-conferences, Workshops, Work-in-Progress Posters (WIPP), Doctoral Student Consortia (DSC), and Early Career Workshop (ECW) where international research communities could interact and share ideas for research in the field of computers in education.

Accepted papers in the main conference, Workshops, WIPP, DSC, ECW, and Extended Summaries (ES) will be published in proceedings indexed in Scopus. Proceedings of the main conference (excluding posters) will also be submitted to Thomson Reuters for inclusion in the Conference Proceedings Citation Index. Authors of accepted distinguished full papers are invited to submit extended versions of the papers for consideration of publication in Research and Practice in Technology Enhanced Learning (RPTEL), the official academic journal of APSCE.

II. KEYNOTE AND THEME-BASED SPEECHES

To enhance global communication and international awareness of research employing computing technologies in the academic community, keynote and theme-based speeches are included. The keynote speech session begins with Prof. Peter Goodyear’s “Computers in Education: Reflections on Learning, Technology and Design”, addressing core issues involved in computer-assisted learning. Then Prof. Vania Dimitrova shares theoretical as well as pedagogical ideas about the integration of artificial intelligence in learning. Prof. Emma Mercier addresses considerations in designing computer-supported collaborative learning, including not only the interplay between classroom features (e.g., teams, tasks, technology, and teachers) but also learning across levels (individual, group, whole class).

Ting-Chia Hsu, in “Mobile-Assisted Language Learning Studies”, guides the audience through how personalized mobile-assisted language learning systems are beneficial in providing adaptively support or learning materials. Lastly, in “A micro-ecological approach to the design and implementation of CSCL in Classrooms”, Prof. Jun Chen Hsieh sheds light on issues related to mobile-assisted learning in “Towards cross-fertilisation of diversified research directions in technology-enhanced learning: Case studies of mobile learning”.

As regards the three theme-based speeches, Prof. Chengjiu Yin, in “e-Books reading log based Learning Analytics”, directs the research attention to learning analytics through e-books reading logs data. Prof. Jun Chen Hsieh is an Assistant Professor of Department of Foreign Languages and Literature at Asia University, Taiwan (curtis3883@gmail.com)

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Received August 20, 2020, Accepted September 2, 2020, Published online September 30, 2020.

III. SUB-CONFERENCES

ICCE 2020 includes seven interrelated theme-based sub-conferences that cater to researchers’ interests. The ICCE C1 subconference on Artificial Intelligence in Education/Intelligent Tutoring System (AIED/ITS) and Adaptive Learning focuses on interactive and adaptive learning environments for all ages and domains. C2 subconference on Computer-supported Collaborative Learning (CSCL) and Learning Sciences emphasizes the design of technology-based formal/informal learning settings and learning analysis in collaborative environments. C3 subconference on Advanced Learning Technologies (ALT), Learning Analytics and Digital Infrastructure features standards development in areas systems, resource, and data interoperability as well as design of advanced learning technologies. C4 subconference on Classroom, Ubiquitous, and Mobile Technologies Enhanced Learning (CUMTEL) covers pedagogical and technological innovations to facilitate pedagogical practices in mobile, contextualized, and ubiquitous learning settings. C5 subconference on Educational Gamification and Game-based Learning (EGG) probes into game-based learning theories, technologies, humanistic design, and practices for all aspects of learning. C6 subconference on Technology Enhanced Language Learning (TELL) examines theories and pedagogical practices of modern technologies to enhance language teaching and learning. Finally, C7 subconference on Practice-driven Research, Teacher Professional Development and Policy of ICT in Education (PTP) concerns research, dissemination, and pedagogical implementation of ICT innovation in education.

IV. REGISTRATION DEADLINES

With ICCE 2020 turning virtual, the registration fee has been greatly reduced (https://icce2020.apsce.net/registration/).

1. September 25, 2020: Authors of main conference papers, workshop papers, extended summaries, WIPPs; participants of ECW and DSC
2. October 9, 2020: Early bird registration
3. October 25, 2020: Regular registration