Academic Journal published by **SGH Warsaw School of Economics**
and **Foundation for the Promotion and Accreditation of Economic Education**

e-mentor

Number 2 (84) 2020 ISSN 1731-6758

ICT in education
Lifelong learning
Business and technologies
New trends in management
Teaching methods and programs

Table of Contents

e-mentor

printed version
of the open access academic journal
e-mentor.edu.pl

Publishers:
SGH Warsaw School of Economics
&
Foundation for the Promotion
and Accreditation
of Economic Education

ISSN 1731-6758

Editorial office:
SGH Warsaw School of Economics
Centre for Open Education
al. Niepodległości 162
02-554 Warsaw, Poland
tel. 22 564 97 23
fax. 22 646 61 42
redakcja@e-mentor.edu.pl

Journal with (20) points awarded by Poland's Ministry of Science and Higher Education. Scientific articles are peer reviewed.

Print: 1000

Dear E-mentor readers,

In the year 2020, we continue publishing some volumes of *E-mentor* academic journal entirely in English. It is my great pleasure to present the next of them. What I find particularly valuable about the current volume is that all papers but one concern teaching and learning. They either directly refer to online education or present the solutions which may equally well be used in online and f2f settings. In the problematic pandemic period when schools and universities were forced to move to the internet space in a rush, many teachers faced the unexpected necessity of changing the teaching methods. From those, they used to apply, sometimes throughout their whole professional lives, to those which fit better to the new reality. Moreover, no one can tell how the new academic year will look like, and whether teaching and learning will take place mostly online or on campus.

However, it seems quite reasonable to get prepared for the prevalence of distant classes. There is no doubt it cannot any longer be emergency remote learning. Therefore, the examples of practices that worked are particularly valuable. I do believe that the readers of the current volume will find the topics covered in it inspirational. I would particularly recommend the conclusions derived from applying the retrieval practice in online courses presented by Michael Kolitsky and the observations concerning interactions in online courses and how they are perceived by students. The authors of that paper are Faye Lesht and David Schejbal.

E-mentor is an open-access journal available for free both online and in printed form. There is also no charge for publishing. All scientific papers are peer-reviewed (we apply the double-blind review procedure), and the journal is indexed in several global databases, including Web of Science ESCI and EBSCO. We systematically extend our international outreach, and in this volume, one can find the texts written not only by the Polish and American authors, who are our most common contributors but also – for the first time – by the author from Bangladesh.

A brief guide for Authors can be found on last but one page of the journal. More detailed instructions and the submission form are available online at http://www.e-mentor.edu.pl/eng/page/8/Info_for_Authors. If you have any questions concerning the publication in *E-mentor*, please contact the editorial team at redakcja@e-mentor.edu.pl.

Maria Zając
Editor

Ministerstwo Nauki i Szkolnictwa Wyższego

„Kontynuacja działań na rzecz zwiększenia międzynarodowego zasięgu czasopisma E-mentor w wersji drukowanej i online (o otwartym dostępie)" – zadanie finansowane w ramach umowy nr 693/P-DUN/2019 ze środków Ministra Nauki i Szkolnictwa Wyższego przeznaczonych na działalność upowszechniającą naukę.

Ministry of Science and Higher Education
Republic of Poland

"Continuing the actions aimed at increasing international outreach of E-mentor scientific journal in print and online (open access)" – a task financed under the agreement No. 693/P-DUN/2019 from the funds of the Minister of Science and Higher Education in Poland designated for the dissemination of research and science achievements.

Faye L. Lesht

David Schejbal

Student perceptions of required student-to-student interactions in online courses

Abstract

This multi-institutional study of undergraduate and graduate students enrolled in online degree programs explored student perceptions of required student-to-student interactions. Using a semi-structured interview methodology, thirty three students participated in the study. While all of the students had experience with the required discussion board interactions of posting and responding, a majority of the students reported experience with other types of required student-to-student interactions including group projects, group presentations, peer reviews, and, for a few, discussions within the required synchronous sessions. The findings indicate that while most students value the concept of peer-to-peer interaction in online courses, many found the required assignments lacking in authenticity and not a good use of their time. Some students reported satisfaction with one or more of the requirements such as small group assignments when time was allowed for coordination, small group discussions, and selected discussion board posts. The students valued the interactions most when those interactions were relevant to their careers.

These findings encourage taking the demographic realities of students studying online into consideration when incorporating student-to-student interactions into courses. Many have family and other obligations, so they are particularly sensitive to work that appears to be trivial or unnecessary. Hence, learning elements such as peer-to-peer interactions should be incorporated into courses intentionally and with purpose so that the interactions do not appear to be busy-work or checking an interaction box.

Keywords: online learning, student interactions, authenticity, online programs

Introduction

Though slower than in years past, enrollments in online courses continue to grow (Seaman et al., 2018). On-campus enrollments, however, have begun to recede at many institutions, especially in the Northeast and Midwest. As demographic shifts continue to impact colleges and universities, many will face significant on-campus enrollment declines by the mid-2020s (Grawe, 2018). Consequently, many institutions are focusing increasingly more on teaching online.

The composition of online students is changing from a historical base of largely adult, part-time, students (Dabbagh, 2007) to a blend of traditional age undergraduate and graduate students along with adult non-traditional students (Lederman, 2018). A key factor associated with learning and satisfaction is engagement (Kahu, 2013; Kuh, 2001, 2003) and this includes engagement in online modalities (Meyer, 2014; Sher, 2009).

Student engagement is a multi-faceted issue that can include an array of interactions, including peer-to-peer interactions among students, student-faculty interactions, interactions between students and outside experts, and so on. Student satisfaction with their learning experiences is a key component in philanthropic behavior of alumni to the institutions from which they graduate (Gaier, 2005; Monks, 2003). While exploring factors influencing online student satisfaction, the authors of this article became aware of an unexpected discord in the literature. Some studies suggest that student-to-student interaction as a form of engagement in online programs is important for student satisfaction, while other studies suggested that it is not significant.

For example, in their three-year study of online student satisfaction, Michele T. Cole et al. (2014) found that limited interaction, including between students and other students, was a leading factor of student dissatisfaction. In contrast, student-to-student

Faye L. Lesht, Marquette University, USA, https://orcid.org/0000-0002-0148-3492
David Schejbal, Excelsior College, USA, https://orcid.org/0000-0001-5656-8146

interaction did not emerge as significant to online student satisfaction in a study of undergraduate and graduate students by Yu-Chun Kuo et al. (2013).

This multi-institutional qualitative study sheds further light on the perceptions of the required peer-to-peer interaction in online courses from the perspective of students in online degree programs.

Related literature

George Lorenzo (2012), based on a review of the literature on factors influencing student satisfaction and encouraging student retention in online courses, suggested that there may be a type of learner, who he refers to as "the independent, self-directed learner" (p. 52), who prefers not to be burdened by required student-to-student interactions. Such learners may not find it "necessary, nor [have] the desire to engage in fully online classes with other students" (p. 52).

Because most online courses are asynchronous, and the students study when and where they can, ensuring that students are properly engaged in online courses presents a challenge to online instructors (Kebritchi et al., 2017). One way that instructors have tried to overcome physical and affective distance in online courses is by requiring students to interact with one another as part of the curriculum (Dixson, 2010). Unfortunately, the research is inconclusive on the benefit of such a requirement for student satisfaction.

Gary Moore et al. (2016) seriously questioned the assumption that student-to-student interactions in online courses are necessary. Their study was conducted over a three-year period of time and their sample was drawn from one department at a state university. They found that, overall, graduate students in their study didn't expect nor value the required student-to-student interactions. Furthermore, discussion forums were criticized by study participants as a poor use of time. Similarly, Janet Buelow et al. (2018) explored ways to enhance student engagement online. A quarter of the students in their study reported they were dissatisfied with online discussions and noted they were "busywork" and "lacked challenge or practical application" (p. 326). In contrast, Florence Martin and Doris Bollinger (2018), using a survey instrument, found that while student-to-instructor engagement was most important to online students, aspects of student-to-student engagement were also deemed important by many of the students. These included an opportunity for students to virtually introduce themselves through online ice breaker activities and working collaboratively online to help each other complete assignments. They noted that "[r]eal-world, authentic, and meaningful assignments kept students engaged in their learning process" (p. 213).

Indeed, based on an extensive review of the literature on authentic learning, Audrey Rule (2006) noted four related themes including "real-world problems" and an approach to exploration that requires "open-ended inquiry" between learners that is personally important to them. Similarly, in a study of students completing an online two-course requirement as part of a Master's of Reading program, Elizabeth Swaggerty and Amy Broemmel (2017) found that students noted as useful peer-to-peer interactions such as peer review of papers as well as discussion forums that allowed students to connect with each other in meaningful ways. In a multi-country study on student satisfaction and learning in online courses, "course design and the learning content" were found to be most significant (Barbera et al., 2013, p. 232) to student satisfaction.

Considering the demographics of today's online students, including that the average age of undergraduate students studying online is 32, and 84% are employed (Friedman, 2017), and that student satisfaction is an important prerequisite to retention in online courses (Bornschlegl & Cashman, 2019; Gaytan, 2015), it is important to better understand the factors that contribute to satisfaction on the part of students in online programs. In particular, given the mixed results of earlier studies on peer-to-peer interactions online, further exploration from the perspective of students on required student-to-student interactions in online courses is timely.

The study

To shed further light on required student-to-student interactions in online courses, this study was designed as a multi-institutional exploratory study using students enrolled in online degree programs through guided interviews. Unlike other studies that tend to focus on undergraduate or graduate students in online courses, this study included participants in undergraduate as well as graduate degree programs. The study's aim was to deepen the understanding of the factors influencing student perceptions of required student-to-student interactions to help facilitate satisfying educational experiences for students in online degree programs. In this way, the study was also intended to contribute to the literature focusing on ways to strengthen institutional affinity on the part of students in online programs. The study's guiding questions were:

(1) How do students enrolled in online degree programs perceive the required student-to-student interactions?
(2) What are the implications of findings for administrators, instructors, and instructional designers?

Method

Participants

Students (17 women and 16 men) enrolled in online degree programs (1 doctoral student, 24 master's degree students, 8 baccalaureate degree students) at 4 universities (3 public research-oriented and 1 private denominational institution), across the USA were invited to participate in this study. An email notice

describing the study was sent by the coordinators of online programs at the respective participating institutions to students enrolled in their online degree programs. The email included a way to contact one of the co-authors if they were interested in participating in the study. One participant had recently completed their online program and was due to graduate; all others were at various stages of matriculation from the first courses in the program to near graduation. A variety of online programs were represented. Participation was voluntary.

Procedures

This was a qualitative study. A semi-structured interview methodology was used to collect data. Upon confirming their interest in participating in the study, the participants were sent the study's Consent Form and a set of semi-structured interview questions. All interviews were conducted in real-time via the Zoom online audio-conferencing system. Originally envisioned as online focus groups – due to scheduling challenges – 14 participants were interviewed alone, and the remaining 19 participants were interviewed as part of 2–3 person groups with an opportunity provided to respond to each question. The interviews lasted between 15 and 40 minutes.

Results

For the purpose of this paper, the terms "discussion boards" and "discussion forums" were used interchangeably by the study participants. All 33 (100%) of the students experienced required discussion board assignments. In addition, 22 participants noted that they also had experience with other types of required student-to-student interactions. These included group projects (e.g., papers, presentations, simulations), peer reviews, and in a few instances, discussion as part of synchronous class sessions. Generic themes and sub-themes are reported in this section. For ease of readership, Table 1 outlines the main themes.

Perceptions of any required student-to-student interactions in their online courses

Over one-half of the students in the sample, 19 (58%), reported that they had mixed experiences with the required student-to-student interactions; 10 (30%) participants found the required interactions useful; 4 (12%) found them not useful.

Authentic interactions between students

In terms of mixed experiences, the students reported dissatisfaction with assignments that they perceived as lacking substance, wasting time, being poorly structured, and – as in the case of group projects – being difficult to coordinate or where students were not responsive. The students found the required interactions useful, including discussion boards, when the discussions were authentic, when instructors provided input through the discussion boards, and when the students came away with a sense that they had learned something from the interactions.

For those who found the required student-to-student interactions not useful, they often said that the discussion forums were "a waste of time" and "not really a discussion," and expressed a general dislike of any type of required student-to-student interactions.

In terms of mixed experiences, one student put it this way:

> Initially, that's a lot of reading … and sometimes it seems [the other students] are agreeing with what the person said or repeating what was said. On the other hand, you get different perspectives, some students relate the topic to their career, get insights, or provide a link to something that's interesting.

Underscoring the theme of authentic communication, a student said that she "hated them all" referring

Table 1. Main themes described in the results section

Authentic interactions between students
Instructor's role in fair and useful student-to-student interactions
Encouraging discussion
Structure of discussion boards
Purpose of discussion boards
Instructor involvement with the boards
Relevance of the discussion to the real-world and to helping each other
Flexibility of the peer-to-peer interaction requirement
Accountability between students
Opportunity to connect meaningfully with other students
Nature of the course

Source: authors' own work.

to the required student-to-student interactions, but noted the following exception:

> In one course, [we] did group exercises so people had different roles and had to solve different problems … and that was useful and interesting; in other courses not useful, not interesting, just another thing to do to get your grade to pass your course.

Those who found the interactions useful included one student who said, "Much of it depends upon engagement of the student and I feel fortunate to be traveling along this path with an engaged group [who are] as excited as I am about the coursework." Another student said, "The student-to-student interaction was extremely helpful to me. I learned as much from other students as I did from faculty and the rest of the class materials." Further on in the interview, this student added, "Discussion boards are useful as long as they … are about the course materials in a substantive way."

Instructor's role in fair and useful student-to-student interactions

Some students commented on the role of instructor involvement in discussion boards. One student noted, "I wished in some courses the professor was participating in the discussion board to nudge people, even to help if the students were drifting." In contrast, another student said, "The student contributions are all very good. I think it is helpful when the professors share responsive posts. That has varied by course in terms of how often the professor posts and how extensive are the professor's posts."

Some students expressed concern about the role of discussion boards in their grades, especially when expectations of engaging in discussion boards was not made explicit by the instructor. One student was concerned about the fairness of using participation in discussion boards when assigning grades and asked us to pass on to instructors "to stick with their expectations on the syllabus and if they modify expectations to let students know of the changes." Similarly, another mentioned that "every professor's grading was different in terms of the discussion boards and not hearing back from an instructor after a week or two [was] a great concern. Professors should talk about their responsiveness [time they will take] to respond to the discussion board."

Perceptions specific to non-discussion board assignments will be addressed later in the results section.

Perceptions specific to discussion board requirements

All students in this study experienced some form of required discussion board or discussion forum post/response in their online programs. In terms of their perceptions of that requirement, 16 (48%) participants indicated that the usefulness of the requirement depended on a number of factors; 7 (21%) found them not useful; 5 (15%) found them useful; and 5 (15%) indicated they were useful provided the execution of the discussion boards met certain criteria, as described by the participants. The factors that the participants indicated influenced their perceptions – one way or another – of the required discussion board interactions pertained to the themes of authenticity, other students, instructor presence, structure of the assignments, and applicability.

Encouraging discussion

As one student stated, "it was robotic … some people literally reply 'good comment' and that isn't useful, it's just noise to go through, it was overwhelming…. I saw benefit of thinking through response to the material, but otherwise not authentic, check-off list and impersonal." Another noted, "well, for most cases, it is a poor use of discussion boards. For example, there wasn't discussion, no back and forth."

A number of students referred to discussion boards as "a waste of time" unless the expectations were clearly stated by the instructors and consistently enforced. As one student put it, "Postings/forums aren't helpful unless there is a clear sense of expectations. Otherwise, 'waste of time' when checking off a box." Another student elaborating on this point noted:

> When you have to respond to other students [discussion boards] can be a waste of time. When I had a class where we had to respond as a major part of the grade and the instructor had clearly stated guidelines, the discussion forum was excellent. When there are a lot of student and expectation is not there then responses are simple and [it is a] waste of time.

Structure of discussion boards

Some students responded to the question about discussion boards by analyzing what went right or wrong with them. For example, one student indicated that she thought that the usefulness of a discussion forum depended on, "how the questions [were] structured, what [was] being asked, and to what detail each person [was] contributing, [was] important. Some classes I learned more from other students than [from] the instructor, but others not so much depending on the structure."

Another example of effective use of a discussion board assignment was shared by one participant who mentioned that, "they were broken up into small groups and the members rotated and that was nice so you could learn from different people, rather than a [discussion] board with 40 different threads…"

Purpose of discussion boards

Another perspective provided by some students had to do with reconsidering the purpose of the forums. As one student expressed it, "with respect to any kind of learning, [the discussion boards were] not helpful for learning, but useful to know someone else was in the class." Another mentioned that:

There were some assignments when they were good – as when they were sharing specific industry knowledge – the ones that weren't beneficial were 'give us the 3 points from reading a, 4 from reading b, and served no benefit because they all wrote the same thing; not a natural conversation.

Focusing specifically on the discussion board requirements, a student said, "I think Discussion Boards are a good format but, as stated previously, [they] need to have more teeth to broaden the interaction and a bit more push/pull among students and conversation." Another student said, "If it is going to have discussion boards, make them small groups; large group posts/responses are not appropriate…"

Instructor involvement with the boards

A number of students emphasized the impact that the instructors had – or didn't have – on their experience of the discussion boards. For example, one student said, "Instructor presence enriches the discussion through their guidance or resources they link to or post as the discussion progresses." As another student stated, "[it] was beneficial if the professor was engaged by reading and commenting, otherwise it was robotic." Another offered, "you don't always trust what students say, so it would be nice if the instructors would chime-in because sometimes students seem off, but other [students] seem more on and trustworthy." Another student indicated that she "wanted more interaction with the instructor to lead the board in a direction that would be more beneficial"; earlier in the interview this student had noted that she would "like to see conversations more about the differences between the text and the work world."

Relevance of the discussion to the real-world and to helping each other

Furthermore, a student noted the best experience they had with discussion boards was an assignment when "it was truly a discussion and included learning different options of ways to do things. The discussion was personally relevant to your career or your area and showing how other people could use that, too." Also, two students indicated that most of the interaction on discussion boards in their courses were more informal "student lounge" type sharing of "practical" program/technical related questions and that emphasis was helpful.

Or, as another student said, "It is kind of nice because if you are missing the point, but if the response [to your post] is constructive, you can pick up what might have been missed."

A student in classes with two types of discussion boards – one on the lessons being covered and another to ask general questions – noted, "It [is] helpful to have interaction with some other people on their experiences with the class, e.g., tips to share, what they're learning. Otherwise, you might feel quite lonely without a discussion board assignment."

The participant added, "it's nice to have [the boards] separated because you don't want to be talking about your frustrations with [the topic] on the thread where you are supposed to be answering your homework questions."

Flexibility of peer-to-peer interaction requirement

Work/life balance was also mentioned, as one participant put it, "One important thing for my schedule – and others – is 80% of work I do happens on weekends because I work during the week … so interactions with students during [the] week is not practical." Similarly, another student mentioned that "most students have full-time jobs and it is good to have flexible ways of participating so everyone can contribute."

Perceptions of required student-to-student interactions in addition to discussion boards

While all students engaged in discussion boards, 22 (67%) indicated that they had also engaged in one or more additional requirements such as peer review, group project, group presentation, and in the case of 3 students, required weekly synchronous sessions with embedded discussions. That includes 8 (36%) who found them useful; 4 (18%) who found them not useful; 5 (23%) with mixed experiences; and 5 (23%) that didn't comment on the additional required student interactions.

Accountability between students

Examples of comments of those who did not find the group work useful included concerns on the work limiting the depth of exploration such as, "… group work not as useful as independent projects because … students have different interests so they find common ground that is in between all interests but then that limits each person's ability to dive deeply into the topic to write about it"; lack of "responsiveness" on the part of other students, "there is always someone who doesn't do their part or doesn't turn it in on time", as well as concern about organizing the division of labor, "got through the group projects, it was a challenge, had to coordinate" with others. Yet another said, "I don't recommend group projects because people weren't responsive." That student also noted that time zone differences caused challenges with the group work.

Opportunity to connect meaningfully with other students

The participants who found the required group work useful were mainly contrasting it with discussion boards that seemed "superficial". The comments included: "Group projects, where they met online, I enjoyed that, it worked pretty well as I got to know that group of individuals during the semester"; "small groups most valuable as you can see the change"; "gained ideas from each other, it mimicked small group work in a class with some dialogue but more

interaction and learning from others." Another participant said they especially favored peer review as it was "always useful because people can read your paper and see it in a different light and help enhance your paper and the instructors have good templates."

Nature of the course

A few found the experience of group work mixed, and the comments focused on this depended on the nature of the course. For example,

in one course they used chat with video, 4 students in a group giving constructive criticism or working on projects and for that [the discussion board] alone wouldn't have satisfied it, so using the video conferencing was crucial for that course; but it wouldn't have been needed for other courses.

To require or not to require peer-to-peer interactions in online courses

A question asked of the participants pertained to whether or not they thought peer-to-peer interactions should be required. A number didn't address the question directly. Of those who commented, insights on the usefulness of required peer interactions in online courses focused on the opportunity for authentic engagement.

For example, one student said,

> Some interaction would be good. The balance is the hard part because you have people doing different things and sometimes you can tell they don't want to do it [interact] that week. Require interaction that occurs a few times during the course so you can skip once in a while, otherwise students might post and not give it a lot of energy. Sometimes in a class, students raise their hands and other times they don't, perhaps because they are not feeling well that week, so why is it online they have to post every week?

Another indicated that student-to-student interaction was important but "not necessary to gain mastery of concepts; however, interacting with peers in corporate world [is expected so good experience], wouldn't mind if it wasn't required but would be missing an element of the 21st century world." Yet, another student said student-to-student interaction was important "especially when they share their experiences or help each other better understand the material." Creating a buddy system, assigning students to small groups for discussion, and rotating responsibilities among a small of group members as part of discussions, and including ways for students to connect so students don't feel too isolated, were also mentioned as ways to enhance the nature of required student-to-student interactions.

A student summed it up as follows, "No matter what you do when you are trying to figure out the integrity of your classes, you have to have some interaction for accountability … but we don't need busy work."

Discussion

An important component of student satisfaction is the extent to which students feel engaged. Engagement is a multi-faceted issue that includes connections with course materials, faculty, other students, and the campus. This is also true in online programs.

Through this current study, we learned that students find student-to-student interactions useful in certain circumstances, e.g., when actual discussion takes place, when they learn from each other. Students do not find student-to-student interactions useful when the required interaction is rote and when instructors are not guiding the process. Many faculty members include peer-to-peer interactions in their online courses, but, as noted by the study participants, in some cases, not enough attention is paid to the structure of those interactions.

Our findings reinforce earlier work that suggests some form of student-to-student interaction is important as long as it is authentic (Martin & Bollinger, 2018; Swaggerty & Broemmel, 2017). Students in our study recommended that faculty consider using small groups – or subgroups – for discussion board assignments to enhance the experience. Making topics and discussions relevant was also noted by students in the study. This corresponds with research by Ji-Hye Park and Hee Jun Choi (2009) who showed predictive "organizational support and relevance" (p. 1) as key factors encouraging retention in online courses. Designing discussion boards to build upon students' real-world experience through sharing of "best practices", problem solving techniques, and tips to assist with the program, as well as with their career aspirations, were also suggested.

Students very much appreciated instructor presence and instructor interaction with the discussion boards. James Johnston et al. (2005) found that student satisfaction was directly related to instructor presence in online courses and cautioned that instructors should not assume that they can be invisible online. Similarly, Sevda Kucuk and Jennifer Richardson (2019) found that "… when the teaching presence is strong, online learners are more likely to be satisfied with their online courses (p. 206). Our study reinforces the importance of instructors guiding the discussion board requirements, rather than accepting superficial comments, such as "good idea", and allowing discussions to flounder.

Underscoring the point, discussion forums that were unstructured, or required posting and responding in ways that were rote in order to complete a course requirement – rather than to enrich their knowledge and skills – were deemed a "waste of time," similar to findings by Janet Buelow et al. (2018) as well as Moore et al. (2016).

Furthermore, required peer-to-peer interactions in online courses should not be assumed to be necessary. In some cases, it might be prudent to have informal discussion opportunities among students or to not have any related requirement regarding student-to-

student engagement. Respondents in this study indicated that required student-to-student interactions should be determined on a course by course basis and not assumed to be appropriate for all online courses and all online students.

In addition, students in our study indicated that the clearer the relationship between the course objectives and the student engagement requirement, and the clearer the design of the expectations for, in this case, discussion board interactions between students, the more worthwhile the students found the experience, provided they were given time to engage thoughtfully with each other.

A few students in the study mentioned the notion of community building through the courses. The literature suggests that social presence reduces feelings of isolation on the part of online students and can facilitate authentic interactions among students on relevant topics (Whiteside et al., 2017). While some students in the study were interested in making those types of connections, others expressed sentiments akin to Lorenzo's (2012) observation that some online students prefer to work independently. Overall, the participants in this study were clear that they did not want to waste their time on activities that they considered superficial. Rather, most students would have preferred no student-to-student interaction over busy work.

Suggestions for online teaching and learning

Primarily, instructors and course designers would benefit from asking themselves the following questions prior to requiring student-to-student interactions in online courses:

1. What can the students gain from interacting with each other given the course content and timeframe of the course (e.g., new perspectives, additional insights into real-world application of the material, communication skills)?
2. Does the potential benefit of student-to-student interaction outweigh the potential costs to students and the instructor in terms of time (e.g., can time be allotted for authentic, rather than rote, interaction between students)?
3. If it is decided that student-to-student interactions are important to the pedagogical experience of the course, how can the course assignments be designed so that the students can engage in meaningful dialogue that will enhance learning of the material and application of the material in the future (e.g., small group discussions, buddy system for exploring real-world application of the material)?
4. How will the instructor guide any required student-to-student interactions in the online course (e.g., ability to make their presence known, to help students stay on point, to clarify issues that emerge during the discussions, to help students work well together)?
5. What informal (during the course) and formal (end-of-course) evaluation methods will be used to assess the usefulness to students of the required student-to-student interactions (e.g., early-course and end-of-course surveys to help strengthen, modify, or eliminate the requirement as appropriate)?

Summary

Among the most important take-aways from this study is that students value their learning and their time. They want authentic experiences that foster the development of knowledge and skills, rather than activities that seem to be filling time rather than purposefully using it. To foster student satisfaction with student-to-student interactions, if a course does include a required discussion board, instructors should be prepared to provide clear guidelines that are enforced for posts and responses, consider assigning students to small subgroups within the boards to encourage actual discussion between students, provide at least periodic input on posts/responses to facilitate learning, and incorporate topics that are relevant to the students' career interests.

In terms of additional requirements beyond discussion boards, instructors would be advised to consider the challenge that online students have in coordinating schedules given that many of them work full-time and/or live across time zones. Instructors should also describe in detail their expectations of the students in group projects so as to address concerns about the distribution of labor and provide contingency plans if students are unable to complete projects as part of a group so as not to disadvantage other members of the group.

Student-to-student interactions in online courses should not be required unless they are going to be well designed. Class requirements should not ask students to post a question so that anyone in the class can respond to it. Rather, assignments should be structured to encourage discussion between a small number of students. They should not encourage a "check-box" approach; rather, they should allow time for students to engage with each other on a topic of relevance. Similarly, required group assignments should take into account the different time zones of the participants and the need to ensure guidelines within the syllabus that address the division of labor and consequences for students being unresponsive to others in their group as well as those not contributing as appropriate to the group's work.

As noted by Sunny Liu (2008), effective online interaction for students isn't an isolated matter. It involves the entire institution. Administrators interested in attracting students to their online programs, instructors seeking to enhance online student learning, and instructional designers assisting the faculty with online courses would be well served to reflect deeply on the use of required student-to-student interactions in their online courses. The implications of this

study suggest that those involved should ensure that student-to-student interactions are authentic, or reconsider the necessity of the requirement on a course by course (instructor by instructor) basis.

Administrators are encouraged to support faculty and instructional designers as they review and revise assignments pertaining to student-to-student interactions in courses. For example, administrators can provide release time for faculty to redevelop their required assignments. Administrators can also illustrate their openness to the complex nature of required student-to-student interactions and encourage dialogue among faculty on whether or not such assignments are useful – and if so how – for a particular course.

Institutions should be concerned about this issue because student satisfaction is an important component in retention and, at least in some countries such as the U.S.A., in philanthropic behavior once the students become alumni.

The authors recommend taking the personal life situations of the students studying online into consideration when incorporating student-to-student interactions into courses. As noted above, the average age of undergraduate students studying online is 32, and 84% are employed (Friedman, 2017). Many have family and other obligations, so they are particularly sensitive to work that appears to be trivial or unnecessary. Hence, learning elements such as peer-to-peer interactions should be incorporated into courses intentionally and with purpose so that the interactions do not appear to be busy-work or checking an interaction box.

Limitations of the study

As a qualitative study, there is the possibility of bias in recording and interpreting the data. Also, the students in this study were at different points of their academic pursuits, e.g., the beginning of their online program, the middle of it, and near or at completion. It is possible that student response was impacted by the amount of time in a program. While acceptable for a qualitative study, the sample size was small.

Suggestions for future research

In terms of future research, assessing students at specific points in their programs might be useful. In this way, an idea of the long-term impact of required student-to-student interactions might be gleaned.

Furthermore, while some work has been done on comparing instructor and student attitudes toward engagement online (e.g., Bollinger & Martin, 2018), a closer look at the factors influencing the decisions faculty make on whether or not to require student-to-student interactions online and whether or not to engage with discussion boards would provide insights that might help guide institutions, instructors, and related staff on this matter.

Considered as a group, it appears that instructors may be underestimating their role in guiding student-to-student interactions and overestimating the benefit of such interactions without adequate instructional direction and oversight. The faculty are themselves juggling numerous responsibilities – professional and personal – and it would be useful to explore the factors influencing instructors' decisions to require or not to require online student-to-student interactions.

A larger sample size – including a multi-country study – could provide further statistical confirmation of the results. This study might also be replicated with alumni of online programs. Further study is encouraged to facilitate the educational experience of online students.

References

Barbera, E., Clara, M., & Linder-Vanberschot, J. A. (2013). Factors influencing student satisfaction and perceived learning in online courses. *E-Learning and Digital Media*, *10*(3), 226–235. https://doi.org/10.2304/elea.2013.10.3.226

Bolliger, D., & Martin, F. (2018). Instructor and student perceptions of online student engagement strategies. *Distance Education*, *39*(4), 568–583. https://doi.org/10.1080/01587919.2018.1520041

Bornschlegl, M., & Cashman, D. (2019). Considering the role of the distance student experience in student satisfaction and retention. *Open Learning*, *34*(2), 139–155. https://doi.org/10.1080/02680513.2018.1509695

Buelow, J. R., Barry, T., & Rich, L. E. (2018). Supporting learning engagement with online students. *Online Learning*, *22*(4), 313–340. https://doi.org/10.24059/olj.v22i4.1384

Cole, M. T., Shelley, D. J., & Swartz, L. B. (2014). Online instruction, e-learning, and student satisfaction: A three-year study. *The International Review of Research in Open and Distributed Learning, 15*(6), 111–131. https://doi.org/10.19173/irrodl.v15i6.1748

Dabbagh, N. (2007). The online learner: Characteristics and pedagogical implications. *Contemporary Issues in Technology and Teacher Education*, *7*(3), 217–226. https://citejournal.org/wp-content/uploads/2014/05/v7i3-general1.pdf

Dixson, M. D. (2010). Creating effective student engagement in online courses: What do students find engaging? *Journal of the Scholarship of Teaching and Learning*, *10*(2), 1–13. https://files.eric.ed.gov/fulltext/EJ890707.pdf

Friedman, J. (2017, April 4). U.S. news data: The average online bachelor's students. *U.S. News & World Report*. https://www.usnews.com/higher-education/online-education/articles/2017-04-04/us-news-data-the-average-online-bachelors-student

Gaier, S. (2005). Alumni satisfaction with their undergraduate academic experience and the impact on alumni giving and participation. *International Journal of Educational Advancement*, *5*(4), 279–288. https://doi.org/10.1057/palgrave.ijea.2140220

Gaytan, J. (2015). Comparing faculty and student perceptions regarding factors that affect retention in online education. *American Journal of Distance Education*, *29*(1), 56–66. https://doi.org/10.1080/08923647.2015.994365

Grawe, N. D. (2018). *Demographics and the demand for higher education*. Johns Hopkins University Press.

Johnston, J., Killion, J., & Oomen, J. (2005). Student satisfaction in the virtual classroom. *The Internet Journal of Allied Health Sciences and Practice, 3*(2), 1–7. https://nsuworks.nova.edu/cgi/viewcontent.cgi?article=1071&context=ijahsp

Kahu, E. R. (2013). Framing student engagement in higher education. *Studies in Higher Education*, *38*, 758–773. https://doi.org/10.1080/03075079.2011.598505

Kebritchi, M., Lipschuetz, A., & Santiague, L. (2017). Issues and challenges for teaching successful online courses in higher education: A literature review. *Journal of Educational Technology Systems. 46*(1), 4–29. https://doi.org/10.1177/0047239516661713

Kucuk, S., & Richardson, J. C. (2019). A structural equation model of predictors of online learners' engagement and satisfaction. *Online Learning, 23*(2), 196–216. https://doi.org/10.24059/olj.v23i2.1455

Kuh, G. D. (2001). Assess what really matters in student learning. *Change: The Magazine of Higher Learning*, *33*(3), 10–17. https://doi.org/10.1080/00091380109601795

Kuh, G. D. (2003). What we're learning about student engagement from NSSE: Benchmarks for effective educational practices. *Change: The Magazine of Higher Learning*, *35*(2), 24–32. https://doi.org/10.1080/00091380309604090

Kuo, Y-C., Walker, A. E., Belland, B. R., & Schroder, K. E. E. (2013). A predictive study of student satisfaction in online education programs. *The International Review of Research in Open and Distributed Learning*, *14*(1), 16–39. https://doi.org/10.19173/irrodl.v14i1.1338

Lederman, D. (2018). Online education ascends. *Inside Higher Education, 7.* https://www.insidehighered.com/digital-learning/article/2018/11/07/new-data-online-enrollments-grow-and-share-overall-enrollment

Liu, S. (2008). Student interaction experience in distance learning courses: A phenomenological study. *Online Journal of Distance Learning Administrators*, *11*(1). http://www.westga.edu/~distance/ojdla/spring111/Liu111.html

Lorenzo, G. (2012). A research review about online learning: Are students satisfied? Why do some succeed and others fail? What contributes to high retention rates and positive learning outcomes? *Internet Learning*, *1*(1), 46–55. https://bit.ly/2ZdzzNf

Martin, F., & Bolliger, D. U. (2018). Engagement matters: Students perceptions on the importance of engagement strategies in online learning environments. *Online Learning*, *22*, 205–222. http://dx.doi.org/10.24059/olj.v22i1.1092

Meyer, K. A. (2014). Student engagement in online learning: What works and why. *ASHE Higher Education Report*, *40*(6), 1–114. https://doi.org/10.1002/aehe.20018

Monks, J. (2003). Patterns of giving to one's alma mater among young graduates from selective institutions. *Economics of Education Review*, *22*(2), 121–130. https://doi.org/10.1016/S0272-7757(02)00036-5

Moore, G. E., Warner, W. J., & Jones, D. W. W. (2016). Student-to-student interaction in distance education classes: What do graduate students want? *Journal of Agricultural Education*, *57*(2), 1–13. https://doi.org/10.5032/jae.2016.02001

Park, J.-H., & Choi, H. J. (2009). Factors influencing adult learners' decision to drop out or persist in online learning. *Educational Technology & Society*, *12*(4), 207–217. https://pdfs.semanticscholar.org/3b3c/47a09120bcd232369e29ea383593e251b220.pdf

Rule, A. (2006). Editorial: The components of authentic learning. *Journal of Authentic Learning*, *3*(1), 1–10. https://bit.ly/3bP3oa3

Seaman, J. E., Allen, I. E., & Seaman, J. (2018). *Grade increase: Tracking distance education in the United States.* Babson Survey Research Group. https://files.eric.ed.gov/fulltext/ED580852.pdf

Sher, A. (2009). Assessing the relationship of student-instructor and student-to-student interaction to student learning and satisfaction in web-based online learning environment. *Journal of Interactive Online Learning*, *8*(2), 102–120. http://www.ncolr.org/jiol/issues/pdf/8.2.1.pdf

Swaggerty, E. A., & Broemmel, A. D. (2017). Authenticity, relevance, and connectedness: Graduate students' learning preferences and experiences in an online reading education course. *Internet and Higher Education, 32,* 80–86. http://dx.doi.org/10.1016/j.iheduc.2016.10.002

Whiteside, A. L, Dikkers, A. G., & Swan, K. (Eds). (2017). *Social presence in online learning: Multiple perspectives on practice and research.* Stylus Publishing.

Faye L. Lesht serves in the role of research associate professor for digital learning at Marquette University. Prior, she was associate director at the center for innovation in teaching and learning at the University of Illinois at Urbana-Champaign. She has worked in the field of online and continuing higher education in roles of administrator, instructor, and academic researcher for over 30 years. Faye's graduate education focused on the administration of continuing higher education. She received her doctorate from the University of Illinois at Urbana-Champaign.

David Schejbal is the incoming president of Excelsior College. Prior, David was vice president and chief of digital learning at Marquette University. David writes and speaks broadly about the future of higher education and how that future is shaped by social, economic, technological, and political forces. His academic interests focus on issues of higher education, sustainability, and the environment. David's academic background is in philosophy, and he received his doctorate from the University of Connecticut.

Anna Wach

Aleksandra Gaweł

Competencies required for teachers in higher education to conduct classes using a strategic business game

Abstract

Contemporary business education should place more emphasis on the development of a proactive attitude among students, engage their creativity in problem solving, shape their analytical competencies and hone their skills related to teamwork, discussion and decision-making. However, this requires the teacher to replace the conventional transmission-based manner of conducting classes with an approach that places the student's activity at the center. Any shift towards designing educational opportunities and supporting students in the process of constructing their knowledge requires a change in the methodological skills of teachers in higher education.

The aim of this article is to present skills related to designing and conducting classes from a constructivist point of view, with the use of strategic business simulation games. The tasks of a teacher using constructivism were examined on the basis of in-depth interviews with university teachers who use business games in their work with students. The present case study shows that when the research participants teach, they create educational opportunities which place their students in problem situations and encourage them to make a series of managerial decisions. They activate the students' prior knowledge, allow them to make mistakes, stimulate interactions in the process of negotiating the meaning of the reality and support them in realizing the knowledge they acquire. The teachers create a context and immerse the students in running a virtual business, giving them an opportunity to build integrated and holistic knowledge. By giving their students autonomy, they teach them self-reliance and responsibility. It was observed in the analyzed narrations that, apart from a change in tools connected with using a business simulation, there was also a change in thinking about learning and teaching. What is of particular importance in this context is that these changes were accompanied by the teacher's development and a transformation from someone who based their classes mainly on experience and intuition, into a reflective and conscious educator who not only understands the mechanisms of learning and teaching, but can also name and explain them.

Keywords: methodological competencies, university teacher, constructivism, strategic virtual games, simulation

Introduction

Contemporary business education should place more emphasis on the development of a proactive attitude among students, engage their creativity in problem solving, shape their analytical competencies and hone their skills related to teamwork, discussion and decision-making, which is exactly what the job market demands. In view of the above, it seems important to consider what teaching methods should be used in higher education and what competencies a contemporary higher education teacher should have to achieve this task. Even though for several decades there has been literature available on academic teaching which emphasized the need to move towards a paradigm that places the student at the center of the process, in reality the kind of teaching in many institutions of higher education differs significantly from these recommendations. Students of business at higher education institutions are still taught using transmission-based methods, mainly lectures, during which the teachers provide obvious and textbook-like information that does not have to be discussed and does not require

Anna Wach, Poznań University of Economics and Business, Poland, https://orcid.org/0000-0001-5670-9754
Aleksandra Gaweł, Poznań University of Economics and Business, Poland, https://orcid.org/0000-0002-7426-3474

critical thinking (Davis, 2011; Prado et al., 2020). Meanwhile, entrepreneurship education requires not only the knowledge of definitions and theories, but also emphasizes the shaping of an entrepreneurial mindset and supporting the process of becoming an entrepreneur (Heinonen & Poikkijoki, 2006; Slattery et al., 2018). Therefore, educating students should involve not only extending their declarative and procedural knowledge, but also shaping new ways of thinking and acting, as well as new skills. This is only possible by designing original learning activities and presenting students with complex business problems that need to be solved (Balan & Metcalfe, 2012; Smith & Beasley, 2011). It is proposed that an approach should be used that encourages students to be more active and that uses elements of experimental learning, learning-by-doing and hands-on-learning (Gaweł & Wach-Kąkolewicz, 2016; Kolodner et al., 2003; Tan & Ng, 2006; Wach, 2019a). In other words, it is about an education system that supports students' in-depth learning (Biggs & Tang, 2007) and uses case studies, simulations, problem-based learning and team-based learning as teaching methods (Lohmann et al., 2019; Prado et al., 2020).

Virtual strategic games correspond to the proposals mentioned above. The literature describes the essence of this method and its benefits for students quite well, but relatively little attention is paid to analyzing virtual strategic games from a teacher's point of view. Using these games in teaching falls within the constructivist paradigm, and in planning and conducting classes the teacher needs to take different actions than when they adopt a typical transmission-based approach, whose foundation is the behaviorist perspective.

The aim of this article is to describe the methodological competencies of university teachers required to conduct classes using virtual strategic games which simulate running a business. The authors present the essence of this method and the competencies of a teacher through the prism of constructivist principles, and then refer to educational practice, i.e. the experiences of teachers who use strategic simulation games to conduct classes at a business university.

Virtual business games as a teaching method

Digital educational games play an increasingly important role in education as they are perceived as active, experiential, situated and problem-based, and encourage an immediate-feedback method of education. However, empirical evidence regarding the effectiveness of digital educational games is mixed (Vanbecelaere et al., 2020).

One of the areas concerning the use of digital education games is management and business education. The history of the modern business simulation game dates back to the 1950s and 1960s (Gonen et al., 2009). Business games use a simulation or a model of an entire enterprise or just its part (Greene, 1960). In these games, students play managerial roles (Jackson, 1959) and run a virtual business by managing its different aspects, such as production, marketing, finance and human resources. Managerial decisions made during the game resemble real business situations (Zantow et al., 2005), which increases the organizational realism of the course and gives students an opportunity for unstructured learning (Tanner & Lindquist, 1998). By providing a context which imitates reality (Lean et al., 2006), these games support authentic education (Reiners et al., 2015) with the opportunity to 'learn by doing' (Garris et al., 2002).

Virtual strategic games allow students to sharpen their decision-making (Gonen et al., 2009) and team working skills through making decisions as part of small, fixed groups with the purpose of completing a set task (Tanner & Lindquist, 1998). Simulations are one example of reflexive learning, in the course of which students build greater confidence in their tacit knowledge and their own experience (Wills & Clerkin, 2009). Business games are also an example of active learning because they give the players an opportunity to use their knowledge in practice (Mitchell, 2004). They are cognitively and emotionally engaging, which has a direct impact on the learners' motivation and their joy of learning (Garris et al., 2002).

The vast majority of the research on virtual business games is conducted from the perspective of assessing the students' learning outcomes (Gonen et al., 2009). In the literature, much less attention is paid to the challenges which this teaching method poses for higher education teachers. Using virtual strategic games in teaching is based on a constructivist education paradigm, and thus requires teachers to have specific competencies to provide this type of education.

Methodological competencies of a higher education teacher in the context of educational constructivism and its principles

The need to change the approach towards using case studies, simulations and virtual strategic games in teaching business subjects also requires a change in what university teachers think about learning and teaching, as well as in the manner of designing and conducting such classes with students. The center of gravity shifts from teaching paradigms which focus on the transmission of knowledge in favor of learning paradigms which place the students' activity at the center (Barr & Tagg, 1995; Biggs & Tang, 2007; Dylak, 2009; Fear et al., 2003; Fry et al., 2009; Kember, 2009; Malewski, 2010; Ramsden, 2002; Wach, 2019b; Wright, 2011). The constructivist paradigm is increasingly present in pedagogical thought and appears to have been the most wide-spread of all learning paradigms in the last decades (Klus-Stańska, 2018; Sajdak, 2013). It is a theory which explains the process of cognition and learning, and its foundations refer to the works of scholars such as Jean Piaget, Lev Vygotsky and Jerome Bruner.

Constructivism is a theory which centers on learning and the learner. A well-turned and to-the-point understanding of learning, as seen from this perspective, can be found in a definition proposed by Stanisław Dylak (2000). Referring to the works of Peter Lloyd (1995) and Charlie Lewis (1996), he points out that "learning (…) is a self-regulatory process of dealing with the conflict between the existing personal models of the world and outside information (…) it is a process of constructing new models and representations of the world with the use of cultural tools and symbols, it is a process of continuously negotiating meanings through learning, teamwork and discourse" (p. 66).

Even though constructivism "describes and explains a 'universal' essence of cognition and learning" (Klus-Stańska, 2018, p. 136), it is not impossible to derive from its main theses some guidelines for designing and conducting classes by "determining which work methods of a teacher offer the opportunity for a better education" (Klus-Stańska, 2018, p. 136). Constructivist principles of learning could serve as a framework for teachers and educators by determining the methodology of teaching (Biggs & Tang, 2007; Fosnot & Perry, 2005; Klus-Stańska, 2010, 2019). An analysis of source literature (Biggs & Tang, 2007; Filipiak, 2012; Fosnot & Perry, 2005; Fry et al., 2009; Klus-Stańska, 2010, 2012, 2018; Ledzińska & Czerniawska, 2011; Pritchard, 2009; Sajdak, 2013) outlined the principles of constructivist teaching according to Dorota Klus-Stańska (2010, 2019), as shown below. These principles are accompanied by similar opinions expressed by other education theorists, serving as the starting point for determining the tasks of a constructivist teacher (Wach, 2019b, 2019c):

- **The basis of educational design is the student's activity.** It is important to trigger cognitive activity, encourage the student to take an action and stimulate an emotional involvement in solving a cognitive task (even if the student is awkward about the new cognitive situation) (Klus-Stańska, 2010, 2019). For the teacher's task at the initial phase of the teaching process, this consists in providing learning opportunities, activating the students' prior knowledge, motivating them and unleashing their autonomy (Olsen, 1999). This solution is proposed instead of an "introduction to the topic", which is characteristic of the transmission-based approach. A constructivist teacher is a designer and moderator of educational situations, a guide rather than a transmitter of knowledge.
- **It is crucial to place the student in problem situations which cause cognitive dissonance and stimulate internal motivation** (Klus-Stańska, 2010, 2019). The proposed tasks should be a challenge and arouse controversy, encouraging the students to make and actively verify their own hypotheses (Fosnot & Perry, 2005). A task should be non-obvious, complex and encourage the students to use various resources to solve it (Olsen, 1999).
- **What is of particular importance in the learning process is the activation of the student's prior knowledge** (Klus-Stańska, 2010, 2019). It is crucial to diagnose prior knowledge, which helps the teacher design cognitive tasks situated in the zone of proximal development. In other words, teachers need to understand from where the learners are starting to allow them to achieve the desired level and seek to correct the underlying misconceptions or gaps (Fry et al., 2009, p. 22). When students are given an opportunity to share their own resources and experiences, learning becomes contextual; one based on dialog, sharing of opinions and cooperation, so that it also reinforces the process of negotiating reality (Olsen, 1999).
- **It is important to discover what the student has in mind, rather than to guess what the teacher has in mind** (Klus-Stańska, 2010, 2019). Therefore, it seems crucial to ask questions and determine the students' models of thought, their perceptions, understandings and images of reality. A teacher encourages learners to formulate and discover rules on their own, and then to defend those views (Brzezińska, 2006; Fosnot & Perry, 2005). Therefore, a teacher supports the process of developing cognitive competencies, such as analytical, reflexive and critical thinking, which shape the learner's in-depth approach towards studying (Biggs & Tang, 2007).
- **The basis of constructivist learning is socially negotiating the understanding of reality in the learning process instead of acquiring someone else's notions** (Klus-Stańska, 2010, 2019). The task of a teacher is to create opportunities for discussing and examining the reality from different perspectives, which supports an in-depth and more insightful understanding of an issue. It also serves to build and rebuild the structures of knowledge, as well as to give one's own meanings to knowledge (Fry et al., 2009).
- **What students memorize are the cognitive procedures leading to the result, not just the result of their mental activity** (Klus-Stańska, 2010). In the constructivist approach, the process of reaching knowledge is more important than the end result, manifested as specific knowledge. This is why the teacher's task is to create a space in which students have an opportunity to explore and discover their own route and their own method of solving a problem, which precedes the explanatory and conceptual activity of the teacher (Klus-Stańska, 2010, p. 332). It is important to give students a chance to form hypotheses, ask questions, organize information according to their own criteria, compare facts, formulate associations and create metaphors. These processes support in-depth, lasting and holistic learning and contribute to the development of cognitive competencies, which humans use at every step of their life-long learning (Olsen, 1999).

- **To a large extent, learning happens at a subconscious level** (Klus-Stańska, 2010), so it is important to ask questions and encourage reflection, which will make it possible to name the occurring processes and increase the awareness of the acquired competencies. A teacher's task is to use various grading methods, including qualitative measuring tools, such as portfolios, essays or open questions (Angelo & Cross, 1993).
- **Mistakes made by students are a natural element of the learning process** (Klus-Stańska, 2010, 2019). A teacher should see mistakes as a result of reasoning (creating a concept of the reality), so it is important not to try to reduce or avoid them (Fosnot & Perry, 2005). It is quite the opposite: a teacher needs to be interested in the students' way of thinking and help them to travel through the process of accommodation. A teacher should not stigmatize, judge or reproach students, but instead treat "erroneous" (i.e. different) interpretations of the reality as an intellectual fact and a starting point for negotiated meanings.
- **The essence of planning the teaching process is designing the educational opportunities without determining any precise learning outcomes** (Klus-Stańska, 2010, 2019). After all, teaching consists in "creating the learner's environment, offering problem situations" (Klus-Stańska, 2010, p. 341), to which meanings will be ascribed by the students themselves. A teacher can outline the area of cognitive activity, but they cannot precisely determine the learning outcomes, which depend on the activity and course of action taken by learners, as well as their cooperation. Therefore, a teacher's task is to follow the students and to react in a flexible manner, depending on the students' interests and other needs.

The presented principles do not exhaust the list of rules important from the point of view of designing and conducting classes inspired by constructivist theses, but they serve as important guidelines in shaping the learning environment by setting tasks and roles for the teacher and for the students. They serve as a framework for a constructivist teacher. They are universal and can be helpful in the process of planning classes, regardless of the academic discipline to which a given subject belongs. In the following part of this paper, the above principles are discussed on the basis of classes that involve a business simulation.

Conducting classes with the use of business games: tasks and challenges for the teacher

The development of the methodological competencies needed to provide entrepreneurship education using a business simulation game is analyzed on the basis of a case study. Its foundation are the experiences of a group of teachers from Poznań University of Economics and Business. The case study involved unstructured in-depth interviews conducted from January to March 2020, as well as participant observation. The group of teachers comprised three people, one woman and two men. Two of them had over 20 years of experience in university teaching. They had all used conventional and modern teaching methods, such as case studies, simulation business games, movie education and project methods.

A business simulation game was first used by one of these university teachers in 2005. Since then this method had been a systemic element of every semester in any given academic year. About 15–20 students participated in each game, divided into 5 groups of 3–4 students. An average game included a sequence of managerial decisions divided into 10 consecutive rounds. When the students started the game, they each had exactly the same opportunities for making decisions. At the end of each round, they were given feedback on the state of their virtual business. It was understood that the consequences of the students' decisions depended not only on the quality of the decisions made by a given team, which reflected their managerial efficiency and whether they correctly understood the needs of the virtual market, but also on the decisions of competing teams. The most important quantitative feedback was the sales volume of a virtual business, which was determined on the basis of complex algorithms. The teachers who led the game could not affect the algorithms that determine the sales volume, because they are a part of the software code. However, they could give feedback to help students understand the causes of their results.

In the first years of experimenting with virtual strategic games, the teachers who participated in the study relied on third-party software. They then took part in the process of developing independent software for the business simulations. The key component was working on an original game scenario. From 2014 on, they only used their own software and an original game scenario when working with the students. They also shared their knowledge on the possibilities of using virtual strategic games in educational practice. Moreover, they participated in a pilot project devoted to using games while working with high-school students as part of their extra-curricular activity.

Business simulation was taught to the students of three majors in Polish and in English. The latter language version was intended for foreign students. Depending on the students' specialization, the game was used in the first or second semester of the first year of their master studies. It could be used as an independent teaching method or combined with lectures on a subject related to entrepreneurship. As a result, the number of games in one academic year was typically 4–6.

During in-depth interviews, the teachers indicated three areas of competence required to conduct classes using virtual strategic games. First of all, as

in any other subject, it was necessary to have core competencies, such as specialist competencies that involve a knowledge of strategic management, human resources management, marketing, finance or operational management, which together represented some decision areas in the game. It was required to guide the students through the business simulation. However, as opposed to the core competencies required to conduct other classes, in this case it was also necessary to be familiar with the mechanics of the game, here the software, algorithms, game scenario, etc. The next area of competence determined by the teachers were digital skills, because the game used online software to simulate the running of a business. The students entered their decisions via the player panel, whereas the teacher managed the game via the game instructor panel. All actions related to organizing the game, assigning students to teams, assigning teams to a specific game, closing subsequent decision rounds and accessing reports on the players' progress, could only be done through the software. As these two areas of competence go beyond the subject of this article, they are not discussed further.

The third group of competencies, which is the most important one with regard to the aim of this article, consisted of the methodological competencies related to designing and conducting classes with the use of games, as well as assessing the students' learning outcomes. The teachers emphasized the fact that conducting classes which apply a simulation method required a change in their attitude to teaching; to seeing the students as learners, to preparing and conducting classes and to the grading method. Given that the study participants had experienced mostly a transmission-based educational approach which relied on the behaviorist paradigm, both in the course of their own education and to a large extent also in their teaching practice, moving away from this approach in favor of a constructivist paradigm was a long-term process based on the observation of the students, their own opinions and an in-depth reflection on the opportunities provided by the different approaches towards teaching. It required a change in thinking and conduct in their work with students.

With every passing game, the teachers became increasingly convinced that using simulation strategic games required a paradigm shift from conventional to student-centered teaching. Every game had its specific dynamics, because each student had different expectations, experiences, attitudes and prior knowledge. Every group of students functioned in its own way, made different choices and had its own method of setting objectives, assigning tasks and implementing strategies. There were teams which focused mainly on competing and the results. Their strategy for the virtual business usually involved taking the offensive, with significant investments in the development of virtual products and virtual markets. Other students preferred to run a smaller business, because it gave them greater certainty that they would achieve the planned results. Even though all players were management students, they could still differ in terms of prior knowledge because at the previous stage of personal development they focused on different areas of knowledge.

The teachers emphasized that teaching competencies must be continually developed. The study participants claimed that it was an open and incomplete process (Kwaśnica, 2006) because every teaching situation was new, encouraged reflection and inspired changes in the method of conducting the classes. This development is in accordance with Kolb's learning cycle (1984). A single class that involved a business simulation game (experience) encouraged reflection on the attitude towards the classes, the manner of presenting the game rules, group dynamics, the manner of interacting with students, etc. (reflection). It inspired some thoughts about the possible directions in which classes could develop, about the expectations of the students and the manner of cooperating with them, etc. (theory), which they then implemented during the next game (practice) (Gaweł & Wach-Kąkolewicz, 2016).

The teachers stated that the constructivist approach required the greatest involvement in preparing the game and then presenting its rules and the player panel to the students. At this stage, it was required to have the methodological skills to be able to design the classes on the basis of the students' activity. When a university teacher prepared a business game, they chose a scenario, the difficulty level, the duration of the game, etc. These choices were to some extent determined by the timetable at the given university, but they were also adjusted to the level of a given student group. Since the players were masters' degree students at a university of economics, they were expected to have prior knowledge of business management strategies. At the planning stage, the teachers specified the organization and course of the classes, as well as the techniques used to assess the learning outcomes. The students were free to choose the manner of making group decisions. They could attend the classes in person and according to the timetable or meet online and complete their tasks at any place and time. The most important element was for the teacher to set the deadline for closing a given decision round.

Even though the presentation of the game scenario and the player panel was a conventional element of the class, the teachers attempted to stimulate their students' cognitive curiosity and internal motivation for work by showing them how a given teaching method differed in comparison to prevailing transmission-based teaching strategies. This meant that at the beginning they would say: "Yes, yes, we will play" or "There won't be any theories or definitions, you will make the managerial decisions while playing the game."

When the rules of such a business simulation game are presented to students, the teacher should also refer to the final grade, which is a formal element of every class. In the constructivist approach, the

teacher's task is to design educational opportunities, but it is impossible to determine the specific learning outcomes due to the fact that every game has different dynamics and the interactions within groups are unique. The methodology of conducting classes is based on the fact that the teacher creates learning situations (participation in a game), taking into account the general learning objectives, such as the ability to manage a business and the development of decision-making, teamwork or analytical skills. However, when we take into account the initial differences in the students' competencies and capabilities, as well as their varying interest in the topic, the learning outcomes depend on the individuals involved. There were students who found it difficult to obtain good results from the game, even from the beginning. In this case, their efforts were to a large extent focused on analyzing the underlying reasons and evaluating the possible ways forward. Therefore, their analytical skills and understanding of the mechanisms related to business management were developed to above average. There were also groups in which students had different ideas as to the development strategy for their virtual business, and their efforts were very strongly focused on seeking substantive arguments in management theory and on trying to convince other team members to support their own vision. Such people developed their negotiation skills, teamwork skills and knowledge of management strategies.

It was not only the acquired knowledge that was graded in class, but also the students' activities, such as making decisions, reaching an agreement as to cooperation within the group, preparing an initial strategy, discussing the final results, analyzing the situation of the virtual business after every round and analyzing the financial and sales results obtained by the company. The players could decide which activities they wanted to undertake and because they were graded for them, they to some extent participated in the grading process. Therefore, they became responsible for their learning, motivating themselves to take action and to shape their autonomy.

The study participants believed that when the game started, the role of the teacher changed from designing tasks for the students to supporting the students in developing their knowledge and business management skills. The students each had to take a series of managerial decisions related to running the virtual business. First they needed to choose a name for their business and assign responsibilities to the team members, then make decisions on operational strategies before finally making specific decisions related to developing product brands, investing in production lines and sales offices, employing people and undertaking operational activities related to production volume, product transport, marketing and finance. They worked at their own pace and the only constant was the jointly agreed moment when a given decision round was closed by the teacher, the latter also monitoring the workflow, providing feedback and asking questions to encourage cognitive exploration.

At this stage, the key methodological competence of a teacher was the ability to put the students in problem situations which caused cognitive dissonance and stimulated internal motivation. The students were used to the fact that in the educational process, teachers expected them to complete tasks in a given way and obtain a pre-established result. Therefore, the students anticipated the same approach in playing the business simulation game, but instead they faced a problem to be solved, while their teacher stressed that there were no right or wrong ways of doing it. What students heard were sentences like: "Your task is to introduce Polish chocolate to a foreign market, what can you do and how?", "You are business owners and managers, which decisions will be crucial?" or "There are no good or bad strategies, each one could be right." It was cognitively intriguing for them, because it forced them to start exploring on their own.

What was of particular significance during the simulation game was the learner's ability to activate their prior knowledge. In a virtual business game, it is assumed that the students must have adequate competencies and the required theoretical knowledge to manage a business, gained by attending other courses at their business university. They only have to apply their knowledge in practice. To activate prior knowledge, the teachers usually asked questions which referred to the students' resources: "In your opinion, what decisions need to be made first?", "What do you know about the pros and cons of the market niche strategy?", "What pricing strategies do you know and which one can you use?"

Still another methodological task of a teacher is to understand that what is memorized by the students are cognitive procedures leading to a result, rather than the outcomes of their mental activity. What is of particular importance is the ability to give the players feedback on the results obtained by their virtual businesses. At the initial stage of the class, the students expected the teachers to give them straightforward answers, because they were accustomed to such an approach in transmission-based education. However, in the constructivist approach used by the study participants, the students received feedback in the form of questions which encouraged reflection (e.g. "What do you think?", "What could be the reason behind such results?", "What could you do?", "What are the pros and cons of different solutions?"), instead of simple tips, such as: "Lower the price of the products." The essence of this approach is to form questions rather than give ready answers. It also requires seeing students' mistakes as a natural element of the learning process. The teachers who participated in the study stated that it was usually obvious for them from the very beginning what problems the players were facing and what mistakes they were making. However, giving feedback in the form of questions which encourage reflection is intended to help students look for an answer and discover it on their own, which is important from the point of view of learning.

The essence of constructivist teaching is also about recognizing the student's intentions, rather than about the student guessing what the teacher's intentions are. Especially at the beginning of the game, the players tended to seek reassurance that they had made the right decisions. In this case, the teachers answered that since it was the students' company, it was their decision and strategy that was correct, not the strategy that would be chosen by the teacher. To encourage the players to think, discussions would often start with questions like: "What are the goals of your company?" or "What is your plan for entering the market and developing your business?" The students were then guided to look for the solutions themselves, thanks to questions like: "What could be the causes behind this failure?", "What could you do to improve the situation of your virtual company?" This approach also supported the processes through which students became aware of what they had learned.

In the constructivist approach, emphasis is also placed on social negotiation of reality, which is the basis of the learning process. This is why students work in groups, often formed on the basis of the Belbin test. Cooperation in small teams fosters interactions and the activation of the learners' prior knowledge. In this process, the students have a chance to share their understanding of the reality and to negotiate the definitions of the various notions and the use of specific strategies in managing their virtual business. The students should always be encouraged to interact with each other. With time, the teacher then joins them and supplies feedback, thus becoming a fully-fledged participant in the learners' discussion.

By observing the students' reactions to the process of implementing a teaching method based on the constructivist approach, it can be noticed that at the beginning of the game the students expect the teachers to adopt a transmission-based approach of the type that they are used to, but as the semester passes, the students become much more independent and open to the new teaching method.

At the end of the study, the participants emphasized that the development of their competencies to teach in accordance with the constructivist paradigm would not have been possible if it was not for the methodological support they had received. What is more, it would not have be possible without feedback from the students and without the reflective thought which accompanied their development as university teachers.

Conclusion

The application of the constructivist model in university education requires the teacher to change their understanding of learning, teaching and the role of students and teachers. Then the teacher can implement the teaching methods and organizational forms which fall within a given teaching paradigm. The teachers from Poznań University of Economics and Business who participated in this study made that effort and used the virtual game method, based on a simulation of running and managing a business. In the beginning, they were not fully aware of the fact that this method would to some extent "force" them to change their way of thinking and transform their methodological competencies. In their educational practice, thanks to the observation of students and themselves, in-depth reflection and sensitivity to feedback, they have changed their approach to teaching and opted for student-centered teaching. They have given up transmission-based methods and the oratory competencies required to give lectures and started to design learning opportunities and use facilitating competencies. Throughout the years of designing a virtual learning environment, they have helped hundreds of students immerse themselves in a simulated educational context so that they felt like real managers running their own business. They have put students in situations in which they had to solve many economic and social problems, have given them the right to make mistakes and have supported them in making decisions, as well as taking responsibility for these decisions. They supported the activation of students' prior knowledge to assist the students in the process of building and rebuilding their knowledge, at the same time encouraging them to reflect on their own learning process. They have engaged in an education methodology which enabled students to integrate their knowledge of economics, finance and management, giving them an opportunity to create knowledge that is coherent, holistic and durable, because they gained it on their own and also in cooperation with other learners.

The process of change in the development of methodological competencies of university teachers who conduct business classes concerned not only their tools (the use of a specific educational method). It was unconscious in the beginning, but due to various training programs, participation in educational projects and methodological support from professionals dealing with university teaching, it has become a conscious process. The university teachers who participated in this study have given up an intuitive approach and moved towards scholarship of teaching and learning (Kreber, 2002), which is among others characterized by the ability to name and explain the mechanisms of educational practice they experienced. Such a situation may be called theorization of their professional experiences, which means they are now teachers aware of the paradigm they use while conducting classes, and better understand the processes of teaching and learning.

References

Angelo, T. A., & Cross, K. P. (1993). *Classroom assessment techniques: a handbook for college teachers*. Jossey-Bass Publishers.

Balan, P., & Metcalfe, M. (2012). Identifying teaching methods that engage entrepreneurship students. *Education and Training, 54*(5), 368–384. https://doi.org/10.1108/00400911211244678

Barr, R. B., & Tagg, J. (1995). From teaching to learning – a new paradigm for undergraduate education. *Change: The Magazine of Higher Learning, 27*(6), 12–26. https://doi.org/10.1080/00091383.1995.10544672

Biggs, J., & Tang, C. (2007). *Teaching for quality learning at university*. Society for Research into Higher Education & Open University Press.

Brzezińska, A. (2006). Wstęp. In J. Bruner (Ed.), *Kultura edukacji.* Universitas.

Davis, J. S. (2011). Games and students: creating innovative professionals. *American Journal of Business Education, 4*(1), 1–12.

Dylak, S. (2000). Konstruktywizm jako obiecująca perspektywa kształcenia nauczycieli. In H. Kwiatkowska, T. Lewowicki, & S. Dylak (Eds.), *Współczesność a kształcenie nauczycieli* (pp. 63–82). Wyższa Szkoła Pedagogiczna ZNP.

Dylak, S. (2009). Koniec „nauczania" czy nowy paradygmat dydaktyczny. In L. Hurło, D. Klus-Stańska, & M. Łojko (Eds.), *Paradygmaty współczesnej dydaktyki* (pp. 40–49). Oficyna Wydawnicza „Impuls".

Fear, F. A., Doberneck, D. M., Robinson, C. F., Fear, K. L., Barr, R. B., Van Den Berg, H., Smith, J., & Petrulis, R. (2003). Meaning making and "The learning paradigm": A provocative idea in practice. *Innovative Higher Education, 27*(3), 151–168. https://doi.org/10.1023/a:1022351126015

Filipiak, E. (2012). *Rozwijanie zdolności uczenia się. Z Wygotskim i Brunerem w tle*. Gdańskie Wydawnictwo Psychologiczne.

Fosnot, C. T., & Perry, R. S. (2005). Constructivism: a psychological theory of learning. In C. T. Fosnot (Ed.), *Constructivism. Theory, perspectives, and practice* (pp. 8–38). Teachers College Press.

Fry, H., Ketteridge, S., & Marshall, S. (Eds.). (2009). *A handbook for teaching and learning in higher education: Enhancing Academic Practice*. Taylor & Francis.

Garris, R., Ahlers, R., & Driskell, J. E. (2002). Games, motivation, and learning: A research and practice model. *Simulation & Gaming, 33*(4), 441–467. https://doi.org/10.1177/1046878102238607

Gaweł, A., & Wach-Kąkolewicz, A. (2016). Konstruktywizm edukacyjny w nauczaniu przedsiębiorczości metodą gier elektronicznych. *Horyzonty Wychowania, 15*(34), 87–102. https://doi.org/10.17399/HW.2016.153405

Gonen, A., Brill, E., & Frank, M. (2009). Learning through business games – an analysis of successes and failures. *On The Horizon, 17*(4), 356–367. https://doi.org/10.1108/10748120910998434

Greene, J. R. (1960). Business gaming for marketing decision. *Journal of Marketing, 27*(1), 21–25. https://doi.org/10.1177/002224296002500103

Heinonen, J., & Poikkijoki, S.-A. (2006). An entrepreneurial-directed approach to entrepreneurship education: Mission impossible? *Journal of Management Development, 25*(1), 80–94. https://doi.org/10.1108/02621710610637981

Jackson, J. R. (1959). Learning from experience in business decision games. *California Management Review, 1*(2), 92–107. https://doi.org/10.2307/41165351

Kember, D. (2009). Promoting student-centred forms of learning across an entire university. *Higher Education, 58*(1), 1–13. https://doi.org/10.1007/s10734-008-9177-6

Klus-Stańska, D. (2010). *Dydaktyka wobec chaosu pojęć i zdarzeń*. Wydawnictwo Akademickie Żak.

Klus-Stańska, D. (2012). *Konstruowanie wiedzy w szkole*. Wydawnictwo Uniwersytetu Warmińsko-Mazurskiego.

Klus-Stańska, D. (2018). *Paradygmaty dydaktyki. Myśleć teorią o praktyce*. Wydawnictwo Naukowe PWN.

Klus-Stańska, D. (2019). Teorie kształcenia. In Z. Kwieciński, & B. Śliwerski (Eds.), *Pedagogika. Podręcznik akademicki*. Wydawnictwo Naukowe PWN.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice Hall.

Kolodner, J. L., Gray, J., & Fasse, B. B. (2003). Promoting transfer through case-based reasoning: rituals and practices in learning by design classrooms. *Cognitive Science Quarterly, 3*(2), 183–232.

Kreber, C. (2002). Teaching excellence, teaching expertise, and the scholarship of teaching. *Innovative Higher Education, 27*(1), 5–23. https://doi.org/10.1023/A:1020464222360

Kwaśnica, R. (2006). Wprowadzenie do myślenia o nauczycielu. In Z. Kwieciński, & B. Śliwerski (Eds.), *Pedagogika. Podręcznik akademicki* (Vol. 2). Wydawnictwo Naukowe PWN.

Lean, J., Moizer, J., Towler, M., & Abbey, C. (2006). Simulations and games. *Active Learning in Higher Education, 7*(3), 227–242. https://doi.org/10.1177/1469787406069056

Ledzińska, M., & Czerniawska, E. (2011). *Psychologia nauczania. Ujęcie poznawcze*. Wydawnictwo Naukowe PWN.

Lohmann, G., Pratt, M. A., Benckendorff, P., Strickland, P., Reynolds, P., & Whitelaw, P. A. (2019). Online business simulations: authentic teamwork, learning outcomes, and satisfaction. *Higher Education, 77*(3), 455–472. https://doi.org/10.1007/s10734-018-0282-x

Malewski, M. (2010). *Od nauczania do uczenia się. O paradygmatycznej zmianie w andragogice*. Wydawnictwo Naukowe Dolnośląskiej Szkoły Wyższej.

Mitchell, R. C. (2004). Combining cases and computer simulations in strategic management courses. *Journal of Education for Business, 79*(4), 198–204. https://doi.org/10.3200/JOEB.79.4.198-204

Olsen, D. G. (1999). Constructivist principles of learning and teaching methods. *Education, 120*(2), 347.

Prado, A. M., Arce, R., Lopez, L. E., García, J., & Pearson, A. A. (2020). Simulations versus case studies: effectively teaching the premises of sustainable development in the classroom. *Journal of Business Ethics, 161*(2), 303–327. https://doi.org/10.1007/s10551-019-04217-5

Pritchard, A. (2009). *Ways of learning: learning theories and learning styles in the classroom*. Routledge Taylor & Francis Group.

Ramsden, P. (2002). *Learning to teach in higher education*. Routledge Taylor & Francis Group.

Reiners, T., Wood, L. C., Gregory, S., & Teräs, H. (2015). Gamification design elements in business education simulations. *Encyclopedia of information science and technology, third edition* (pp. 3048–3061). IGI Global.

Sajdak, A. (2013). *Paradygmaty kształcenia studentów i wspierania rozwoju nauczycieli akademickich. Teoretyczne podstawy dydaktyki akademickiej*. Oficyna Wydawnicza „Impuls".

Slattery, D., O'Brien, M., & Costin, Y. (2018). Using simulation to develop entrepreneurial skills and mind-set: an exploratory case study. *International Journal of Teaching and Learning in Higher Education, 30*(1), 136–145.

Smith, K., & Beasley, M. (2011). Graduate entrepreneurs: intentions, barriers and solutions. *Education and Training, 53*(8/9), 722–740. https://doi.org/10.1108/00400911111185044

Tan, S. S., & Ng, C. K. F. (2006). A problem-based learning approach to entrepreneurship education. *Education and Training, 48*(6), 416–428. https://doi.org/10.1108/00400910610692606

Tanner, M. M., & Lindquist, T. M. (1998). TEACHING RESOURCE Using MONOPOLY TM and Teams-GamesTournaments in accounting education: a cooperative learning teaching resource. *Accounting Education, 7*(2), 139–162. https://doi.org/10.1080/096392898331225

Vanbecelaere, S., Van den Berghe, K., Cornillie, F., Sasanguie, D., Reynvoet, B., & Depaepe, F. (2020). The effects of two digital educational games on cognitive and non-cognitive math and reading outcomes. *Computers & Education, 143*, 103680. https://doi.org/10.1016/j.compedu.2019.103680

Wach, A. (2019a). Constructivist approach in business education with the use of virtual simulations. In B. Lund, & S. Arndt (Eds.), *The creative university. Contemporary responses to the changing role of the university* (pp. 84–101). Brill | Sense.

Wach, A. (2019b). *Stawanie się nauczycielem akademickim. W kierunku wspierania uczenia się poprzez refleksyjną praktykę*. Wydawnictwo Kontekst.

Wach, A. (2019c). The university teacher's competence in the process of the paradigmatic shift. In M. Pietrzykowski (Ed.), *Fostering entrepreneurial and sales competencies in higher education* (pp. 11–26). Wydawnictwo Bogucki.

Wills, K. V., & Clerkin, T. A. (2009). Incorporating reflective practice into team simulation projects for improved learning outcomes. *Business Communication Quarterly, 72*(2), 221–227. https://doi.org/10.1177/1080569909334559

Wright, G. B. (2011). Student-centered learning in higher education. *International Journal of Teaching and Learning in Higher Education, 23*(3), 92–97.

Zantow, K., Knowlton, D. S., & Sharp, D. C. (2005). More than fun and games: reconsidering the virtues of strategic management simulations. *Academy of Management Learning & Education, 4*(4), 451–458. https://doi.org/10.5465/amle.2005.19086786

Anna Wach has a PhD in pedagogy and is an Assistant Professor at the Department of Education and Personnel Development at Poznań University of Economics and Business. She is the author of numerous publications on e-learning, university teaching and the development of teaching competencies, including a monograph entitled *Stawanie się nauczycielem akademickim. W kierunku wspierania uczenia się poprzez refleksyjną praktykę* (2019). She combines her scientific interests with her teaching and other activities that support the professionalization of the competencies possessed by higher-education teachers. She has authored and initiated numerous programs and development projects for higher-education teachers.

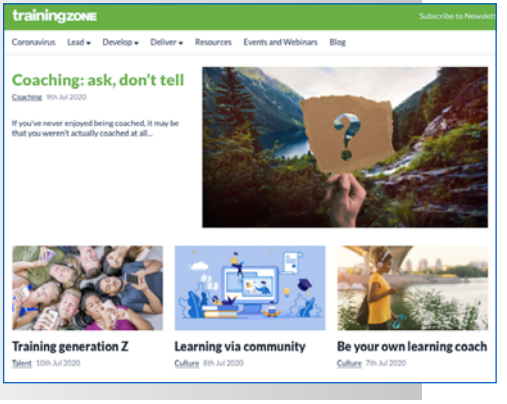
Aleksandra Gaweł is a Professor of Economics and a professor at the Department of International Competitiveness at Poznań University of Economics and Business. Her research interests and publications focus on entrepreneurship, innovation, the establishment of new enterprises, competitiveness and entrepreneurship education. She is involved in many national and international programs, dedicated mainly to innovative methods of entrepreneurship teaching.

We recommend

Trends in Learning 2020, Report & TrainingZone hub, The Open University, UK

In May 2020 the Open University published its annual report concerning current trends in learning. Every year since 2012, the group of experts from the Open University tracks what is new and what is changing to identify the most important developments. In this year's report, four key trends have been identified that, according to its authors, are shaping the future of learning. They are AI in education/learning, learning through open data, engaging with data ethics and learning from animations.

In reference to the report, the Open University offers a new initiative called the TrainingZone hub. Its content is versatile and up to date. There are numerous downloadable resources – whitepapers, eBooks, toolkits and reports. Another source of information is events and webinars – both live and on-demand – as well as the articles and blog posts, which are grouped in three main categories: Lead, Develop and Deliver. The hub is aimed to support L&D Professionals in organizing and delivering flexible learning which is one of the trends identified in the report.



A brief report preview is available on YouTube: **https://youtu.be/5-62aYsNfxQ** More information and the link to download the report can be found at **http://www.open.ac.uk/business/trends-in-learning-2020**, whereas the URL to TrainingZone is **https://www.trainingzone.co.uk**

Andrzej J. Gapinski

A digital electronics course based on a hybrid delivery method using Digilent BASYS FPGA boards

Abstract

The article discusses the teaching methodology for a digital electronics course utilizing BASYS Field Programmable Gate Array (FPGA) boards (Digilent, Inc.), with a hybrid or blended classroom delivery method. The article outlines a methodology that combines the teaching of current digital circuit design technology with the use of a pedagogical approach to online delivery for a proportion of the course lectures. The FPGA boards by Digilent offer a modern PLD technology platform where beginners and more advanced practitioners alike may design and implement digital circuits with various operational capabilities. This means that the boards offer state-of-the art technology for computer engineering instructors to effectively introduce modern programmable memory technologies in the classroom. However, in light of the increased necessity for flexibility in college course delivery methods, the article also shows a successful method of material delivery that incorporates an online component. This aspect addresses the current expectations for greater course delivery flexibility and convenience due to the increasing number of adult students who need to work to support themselves and/or their families. Thus, the article offers an effective pedagogical approach to teaching current digital circuit analysis and design using a modern material delivery method.

Keywords: digital circuit design, hybrid or blended delivery method, programmable memory devices, computer engineering course, VHDL

Introduction

The last few decades have brought dramatic advances in engineering, especially in the area of digital technologies. Within this field, programmable logic devices (PLD) have played an increasingly important role in the design and implementation of digital circuits. While PLD platforms encompass a variety of different technologies, the field programmable gate array (FPGA) stands out currently as being the most advanced. The accompanying programming languages used to program PLDs and FPGAs underwent parallel advancements. These programming languages, known as hardware description languages (HDLs) (Hardware description language, n.d.), were adopted and have seen increasing acceptance through the years by engineering and industrial designers and practitioners alike. Regarding HDL platforms, it seems that VHDL has become the most dominant programming language used for programmable digital design and synthesis. There are already many resources on VHDL available in the literature, such as Sudhakar Yalamanchili (2005) or Peter Ashenden (2008).

Over the last three decades many researchers and academicians have written textbooks on digital analysis and design, including Randy Katz and Gaetano Borriello (2004), Frank Scarpino (1998), David Van den Bout (1998), and Sunggu Lee (1999). However, only the more recent publications and textbooks (Widmer et al., 2017; Mano & Ciletti, 2018; or Haskell & Hanna, 2009) provide more complete exposure to analysis and design with PLD using a specific HDL programming language and selected PLD technology. A recent publication (Gapinski, 2018) discusses the digital design of the selected combinatorial and sequential circuits with the FPGA technology used by Digilent FPGA boards.

In considering the fast pace of change in the technology of digital circuits, it would seem that the pedagogy of teaching and learning have been left behind with the adoption of new material delivery methods. The university teaching processes,

Andrzej J. Gapinski, Penn State University, USA, https://orcid.org/0000-0002-5570-1221

confined to on-campus face-to-face sessions used since the beginning of the existence of higher learning institutions, have only relatively recently begun to adapt to market forces and the changing landscape of student expectations through the adoption of online teaching methods. One of these pedagogical methods of material delivery is a hybrid or blended form, which is understood here as "an educational approach that combines online instruction with face-to-face instruction," after Randy Garrison and Heather Kanuka (2004), and Mark Lamport and Randy Hill (2012). In the last decade or so the blended format approach has gained increasing adoption in universities and colleges in the USA, although the predominant method still remains the face-to-face form. See Betty Collis et al. (2003), Charles Dziuban et al. (2004), Garrison and Kanuka (2004), Lamport and Hill (2012), and Barbara Means et al. (2010). The worldwide events associated with the coronavirus pandemic changed the situation drastically and forced academic institutions to switch to online delivery completely in the spring of 2020, resulting in a more prevalent adoption of technological tools (Marcus, 2020). Naturally, those instructors who were already familiar with hybrid or blended methods in teaching were much better equipped to deal with the new circumstances, and switched to online delivery relatively more quickly.

Aliye Karabulut Ilgu and Charles Jahren (2015) analyzed the survey results of instructors who had extensive experience with hybrid teaching, concluding that hybrid learning provides such benefits as: flexibility, convenience, self-paced learning, improvement in student engagement and empowerment, free time for complex problem solving, and improved efficiency of classroom use at the institutional level. They list some of the difficulties experienced by the faculty they surveyed, including the time investment required for initial course development, reduced interaction with students, insufficient instructional/institutional support, and technical issues associated with online delivery that had to be resolved. Interestingly, a meta-analysis of the effectiveness of online education by the U.S. Department of Education (Means et al., 2010) reported that students in an online learning environment performed modestly better than in a face-to-face environment, and that hybrid learning provided better results than both face-to-face and pure online methods. The meta-analysis by Means et al. (2010) was performed based on empirical studies in higher education of many disciplines such as: medical education, career technology, corporate and military training, and a small number of K-12 studies to ensure that the study was very broad in scope. As far as devising effective methodologies for online educational sessions, the study indicates that: "attempts to guide the online interactions of groups of learners were less successful than the use of mechanisms to prompt reflection and self-assessment on the part of individual learners." Thus, the study by Means et al. (2010, p. 48) suggests that instructors, while preparing the pedagogical methodologies for online learning, should focus more on incorporating techniques that induce individual reflection and self-assessment by the learner than group interactions in order to achieve success in meeting the educational objectives. The main objective of the Means et al. (2010, p. xi) study was to "provide policy-makers, administrators and educators with research-based guidance on how to implement online learning for K–12 education and teacher preparation." In contrast, the author's experience was based exclusively on teaching and learning processes performed with engineering students. As far as the learning outcomes were concerned, the author did not observe any significant differences between the standard face-to-face and hybrid instruction methods. Thus, the author's experiences in teaching the course discussed here do not replicate the conclusions of Means et al. (2010). Furthermore, in the author's observations, e-learning is more suitable for more self-disciplined and motivated individuals with a better academic standing. The academically weaker students, based on the author's observations, need much more, if not entirely, face-to-face instruction to learn the material satisfactorily.

Consequently, the article discusses the teaching of digital circuit analysis and design using a hybrid delivery format. The course is a required freshman EET/EMET class that uses current FPGA technology with boards by Digilent, Inc. (www.digilentinc.com) in the digital design of selected combinatorial and sequential circuits with the VHDL programming language. By demonstrating how to introduce the most modern technology in the engineering/engineering technology curriculum using a blended method of delivery, the article provides the engineering faculty with an effective pedagogical methodology of introducing current programmable memory technology within a university program.

Hybrid or blended format as a course delivery method

Digital circuit design courses play an important role in electrical and computer engineering curricula at colleges and universities across the USA. Consequently, the instructors of digital design courses often face the issue of selecting a suitable material delivery methodology on top of selecting a current technology to be used for illustration and implementation of the designs. The digital design course material is usually delivered via lecture and accompanied by laboratory sessions. However, the recent decade or so has brought a new consideration in the selection of viable course delivery methods, namely the changing demographics of the student body. The latter features an increasing number of adult students who either work part-time or full-time, which brings to the fore the issue of how to accommodate them in the course content delivery process. The increasing number of adult working students within the

student body forces educational institutions and their instructors to seek new ways of accommodating student needs and to offer novel methods of material delivery with an online component (Collis et al., 2003; Dziuban et al., 2004; Gapinski, 2012; Garrison & Kanuka, 2004; Lamport & Hill, 2012; Means et al., 2010; Turula, 2017).

Recently, based on long experience with hybrid delivery in other engineering technology courses (see Gapinski, 2012, 2013), the author offered a digital circuit design class using a blended or hybrid format. Prior to the hybrid format, the standard face-to-face course delivery method meant meeting twice a week for a lecture and once a week for a laboratory session. With the new blended delivery method the first of the two weekly lecture sessions was delivered online via a synchronous mode. The online synchronous session was offered at the same time of day as the one taught on campus. The online sessions were recorded and available to students for retrieval online via a university course management system (Canvas). The second weekly lecture session and the accompanying laboratory session were held on-campus in face-to-face settings. As far as topical delivery breakdown was concerned, while the online sessions usually introduced the main concepts to the students, the face-to-face campus sessions were devoted to a more detailed analysis and practice. Consequently, as far as the material breakdown was concerned, about 40% of the lecture material was delivered online with the rest as on-campus delivery. For the online component, the author successfully used the Penn State University video-conferencing tool offered by Adobe Inc., and more recently the videoconferencing tool provided by Zoom. The video-conferencing tools allowed content delivery via a computer monitor, including an interactive drawing capability (used by both instructor and students) and chat/text boxes for the exchange of written information, which allowed the instructor to answer questions posted by the participating students, and vice versa. The author also used the interactive mode online occasionally to allow students to draw their concepts on the partitioned screen during the lecture or discussion sessions. The author, while preparing material for delivery, selected specific techniques that induced prompt reflection and self-assessment on the part of the individual learner (specific and open-ended questions, opening/closing reflective prompts, 3-2-1 technique (DASA, 2018)) during the online sessions.

Naturally, the interactive online mode was only manageable with a limited number of students (not exceeding 12–15). The author also used the video-conferencing tools to deliver ad-hoc help sessions to individual students at mutually agreeable time slots. The anonymous surveys showed positive appreciation of the hybrid delivery method, especially by commuting students who often indicated significant time savings by not having to travel to campus. The students in their written comments expressed an appreciation of the flexibility and convenience offered by the hybrid method. As far as learning effectiveness and meeting the teaching objectives were concerned, the author did not notice any significant differences in either the comprehension of the material by students or the achievement of educational outcomes in comparison to traditional face-to-face teaching/learning scenarios. Consequently, the author's experience does not confirm the results of Means et al. (2010) described earlier. In general, the author's experience verifies the anecdotal evidence that e-learning, either as a component of class delivery or a wholly online mode, is better suited to students who are already self-disciplined, motivated and having a better academic standing.

FPGA boards by Digilent, Inc.

The FPGAs boards by Digilent, Inc. were used to implement the designs of combinatorial and sequential circuits. The boards hosted XILINX FPGA chips (www.xilinx.com). The specific boards were the BASYS 2 and 3, hosting Xilinx Spartan-3E FPGA and Xilinx Artix-7 FPGA, respectively. To design and program the chips on the BASYS 2 and 3 boards, the author used Xilinx ISE and Xilinx Vivado software platforms, respectively.

These modern boards hosted powerful FPGA chips by Xilinx, each of which provided hundreds of thousands of gates for high performance logic functions.

The BASYS 3 board offered improved hardware capabilities over the BASYS 2 board, with 15 times the number of logic cells (from 2,160 to 33,280) and 26 times more RAM (Random Access Memory) etc. The BASYS 3 had the following specifications (www.digilent.com):

- 33,280 logic cells in 5,200 slices (each slice contains 4 x 6-input LUTs (Look-up Tables) and 8 flip-flops);
- 1,800 Kbits of fast-block RAM;
- five clock management tiles, each with a phase-locked loop (PLL);
- 90 DSP slices;
- internal clock speeds exceeding 450 MHz;
- on-chip analog-to-digital converter (XADC);
- 16-user switches;
- 16-user LEDs;
- 5-user pushbuttons;
- 4-digit 7-segment display;
- 4 Pmod connectors: 3 standard 12-pin Pmod & 1 dual-purpose XADC signal / standard Pmod;
- 12-bit VGA output;
- USB-UART bridge;
- serial flash;
- Digilent USB-JTAG port for FPGA programming and communication;
- USB HID host for mice, keyboards, and memory sticks.

Pedagogy of teaching digital design

The digital circuit analysis and design curriculum in engineering and engineering technology education traditionally involved discrete integrated chips in the implementation process. As technology progressed, the PLD technology was adopted for implementing digital designs throughout academic engineering programs. However, the digital circuit design pedagogy remains an open field, where individual instructors have to choose the teaching methodologies to meet the student learning outcomes within the program and to take into account the students' programming background and skills. In addition, the instructors have to choose the pedagogy to match the available local campus hardware. Thus, an instructor has to devise effective pedagogical methodologies, which usually involves migrating from discrete integrated chips to PLD devices. Consequently, introductory digital design courses are usually more challenging for instructors, since the students in these courses have rarely been exposed to any type of prior programming experience.

Furthermore, instructors increasingly have to offer more flexibility in content delivery due to the changing demographics of the students. Consequently, depending on local circumstances, finding the most effective method of material delivery often involves, besides the face-to-face on-campus sessions, the inclusion of some type of e-learning component.

In his introductory digital design course, the author usually began the design implementations with discrete elements, and then migrated towards PLD devices throughout the semester work. The accompanying laboratory sessions, usually with team-based activities, allowed the students to learn from each other and to fill the gaps in their knowledge accordingly. Naturally, the pace of the transition from discrete chip technology to HDL programming and PLD implementation had to be devised carefully. While VHDL essentials could be introduced in the lecture format, involving both online and campus settings, the practical examples were discussed and reinforced in the laboratory sessions. The more advanced digital circuit design courses did not usually present such a challenge, since the students were already skillful and knowledgeable in specific HDL programming.

Later, due to the need to accommodate working students, the author began to deliver the course in a hybrid format. While the online sessions were devoted to the introduction of major concepts, the campus face-to-face sessions were much more detail oriented, involving the analysis and design aspects of the various circuits.

The following sections show the application of state-of-the-art FPGA boards in combinational and sequential circuit design and implementation. While the general concepts of the designs were introduced in online sessions, the subsequent campus sessions allowed the students to actually develop their designs and implement them using XILINX ISE / VIVADO software and FPGA boards by Digilent.

Digital electronics – course contents

Digital Electronics was a required course for freshman students in the Electrical Engineering Technology (EET) associate degree program and the Electro-Mechanical Engineering Technology (EMET) bachelor program at Penn State University. The purpose of the course was to teach the principles of digital electronics. The course duration was of fifteen weeks, for 3 credits with an accompanied laboratory class of 1 credit in a typical spring semester.

The material covered a variety of topics, including number systems, Boolean algebra, basic logic gates, logic circuits, flip-flops, registers, arithmetic circuits, counters, interfacing with analog devices, and computer memory with PLDs, as listed below:

- unsigned number systems including decimal, binary, octal, hex and base conversion;
- codes – BCD, Gray, ASCII and parity;
- basic digital logic gates (AND/OR) and truth tables;
- Boolean algebra – postulate and theorems, equation reductions and circuit implementations;
- DeMorgan's theorems – NAND and NOR gates, and implementation;
- sum of product circuits;
- HDL: VHDL;
- Karnaugh map and circuit simplification;
- multiplexers, demultiplexers, decoders and other MSI circuits;
- basic SR Flip-Flops – NAND & NOR implementations and limitations;
- D Latch, Clocked and Edge Triggered D Flip-Flops;
- Edge Triggered JK Flip-Flop;
- Ripple Counter;
- DAC & ADC principles;
- sequential logic – synchronous counters, shift registers and basic state machine concepts;
- memory systems – RAM, ROM, PROM, EEPROM, etc.;
- programmable memory: PAL, PLA, PLD devices w/FPGAs.

The material was delivered, as explained earlier, during face-to-face on-campus sessions and online synchronously for the lecture component. The accompanying laboratory sessions took place on the campus. All class material, including MS Power Point slides, recorded online sessions and additional materials on specific topics based on recent technological development, were available for student retrieval 24/7 via the university course management software. Course material comprehension assessment included written examinations, problem solving in both face-to-face and online sessions, laboratory work on campus, written laboratory reports, participation in online sessions, and online timed quizzes. As far as material content delivery breakdown was concerned, about 40% of the lecture material was delivered online.

Digital circuit design examples

This section discusses two examples of digital design, as implemented with the FPGA BASYS 2 and 3 boards. As discussed earlier the design general themes of these two digital circuits were introduced in the online sessions and the design details were subject to face-to-face discussions in classroom settings. The first example illustrates the implementation of a 4-Bit Counter and the second example a 3-Line – To – 8-Line Decoder implemented with the BASYS 2 board and more advanced BASYS 3 board, respectively. The design work was then presented at the IEMS'2019 conference (Gapinski, 2019). For further details of the analysis and design of digital circuits with FPGA technology based on Digilent boards, see the book by Haskell and Hanna (2009) and the more recent book by Andrzej Gapinski (2018). VHDL code was used for the design work.

Example 1 - a 4-bit counter

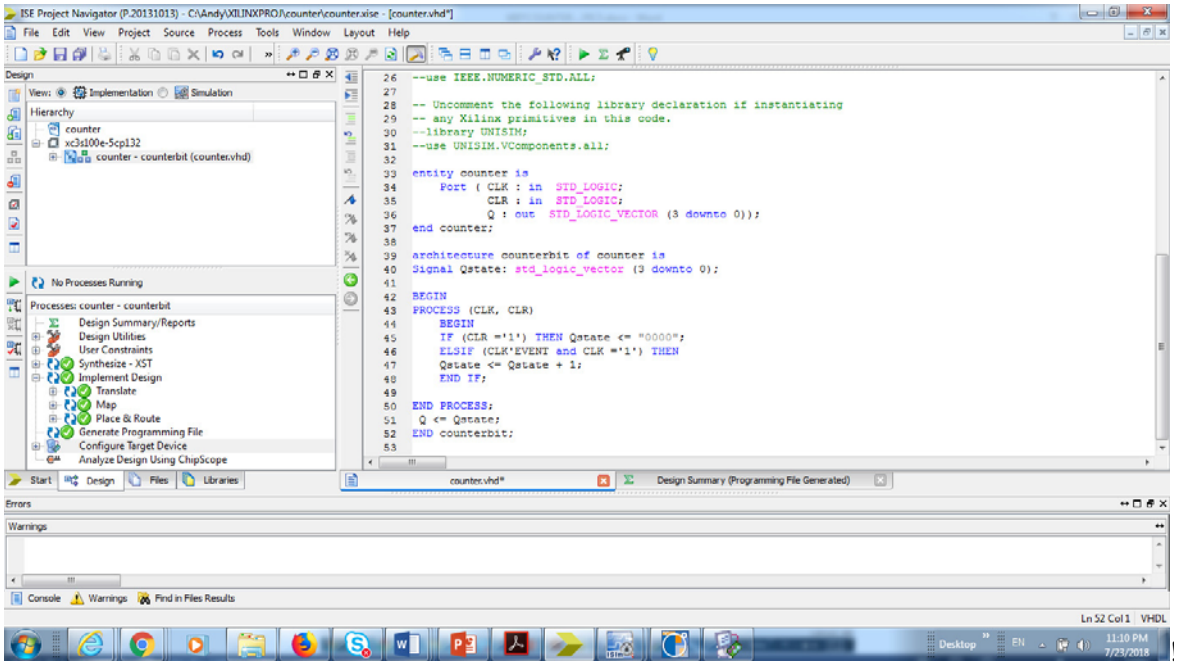
The following VHDL code was used for the counter synthesis (see Listing 1).

For the synthesis process, compilation, simulation, and chip programming, see Figures 1–5 below.

Listing 1. 4-bit counter VHDL code

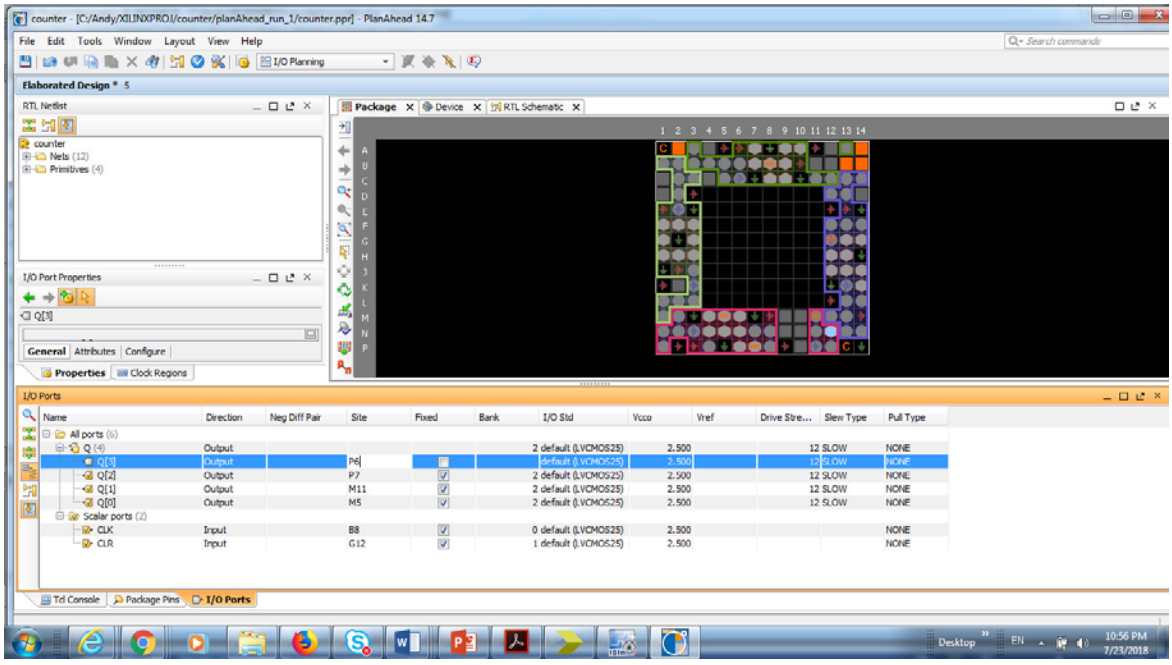
```
Library IEEE;
Use IEEE.std_logic_1164.all;
Use IEEE.std_logic_unsigned.all;
ENTITY counter IS
Port (CLK: in STD_LOGIC;
      CLR: in STD_LOGIC;
      Q: out STD_LOGIC_VECTOR (3 downto 0);
END counter;
ARCHITECTURE counterbit OF counter IS
SIGNAL Qstate: STD_LOGIC_VECTOR (3 downto 0);
BEGIN
PROCESS (CLK, CLR)
  BEGIN
      IF (CLR = '1') THEN Qstate <= "0000";
  ELSIF (CLK'EVENT and CLK ='1') THEN
      Qstate <= Qstate +1;
  END if;
END PROCESS;
Q <= Qstate;
END counterbit;
```

Figure 1. Xilinx ISE Project Navigator screenshot with VHDL code of the counter and successful synthesis performed as indicated in the process window



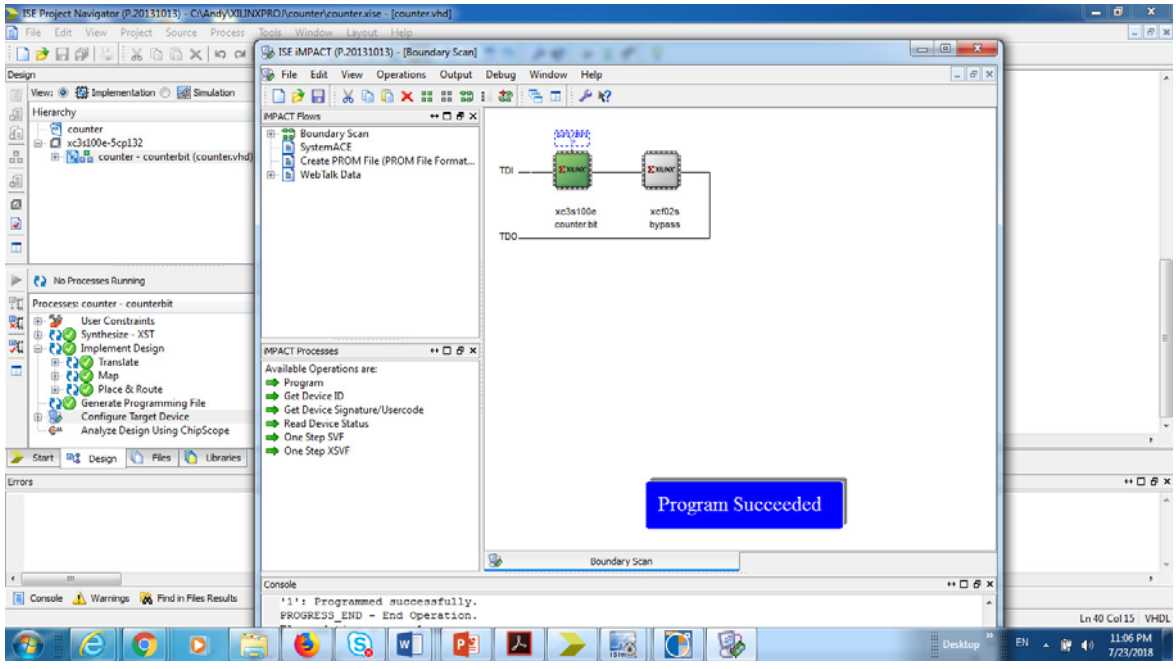
Source: Xilinx ISE Project Navigator.

Figure 2. ISE PlanAhead. UCF file. Pin assignments



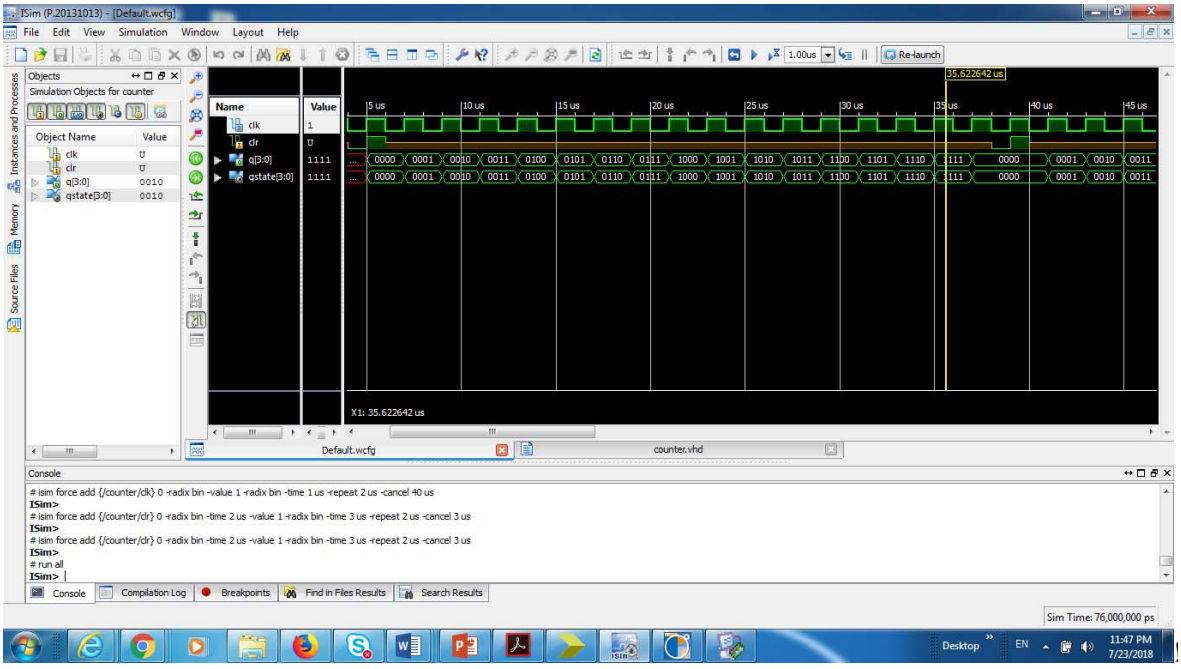
Source: ISE Software.

Figure 3. ISE synthesis successful. iMPACT used for downloading bit file



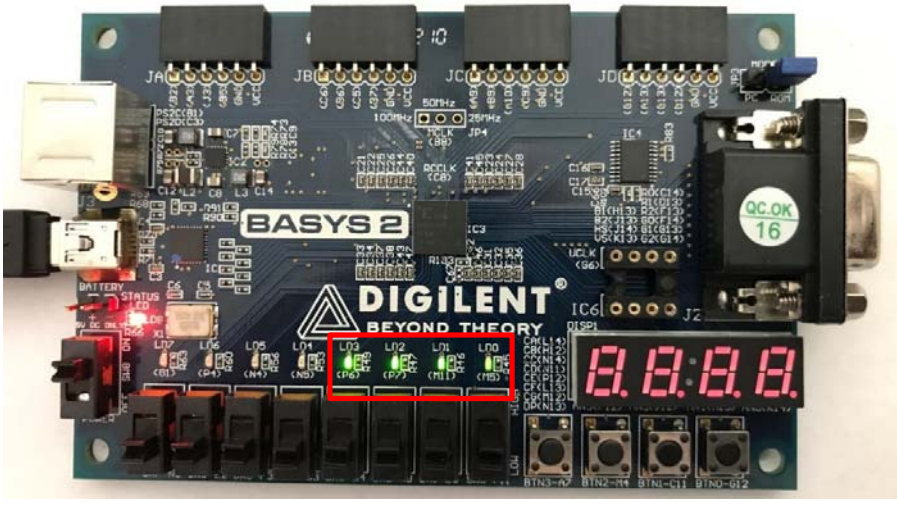
Source: ISE Software.

Figure 4. ISE ISim Simulator screenshot showing simulation of the 4-bit counter. Clock period set at T = 2us. A successful count is displayed



Source: ISE ISim Simulator.

Figure 5. BASYS 2 board. 4-bit counter. Screenshot shows illumination of four LEDs as outputs



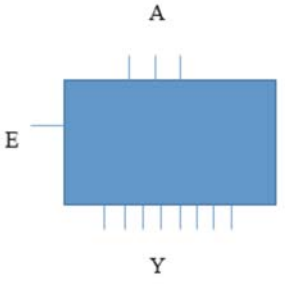
Source: Digilent Inc.

Example 2 - a 3-line to 8-line decoder

In this exercise a generic 3 x 8 decoder depicted in Figure 6 was implemented.

A 3 x 8 decoder has 3 x input lines (A = A2 A1 A0), enables line E, and 8 x output lines (Y = Y7Y6Y5Y4Y3Y2Y1Y0). When enabled, a decoder activates one output line depending on the binary value of the inputs. For example, if input line A = 010, the decoder activates output Y2 while keeping all remaining outputs disabled. For the VHDL code for this decoder, see Listing 2.

Figure 6. Model of 1-of-8 decoder



Listing 2. Decoder VHDL code

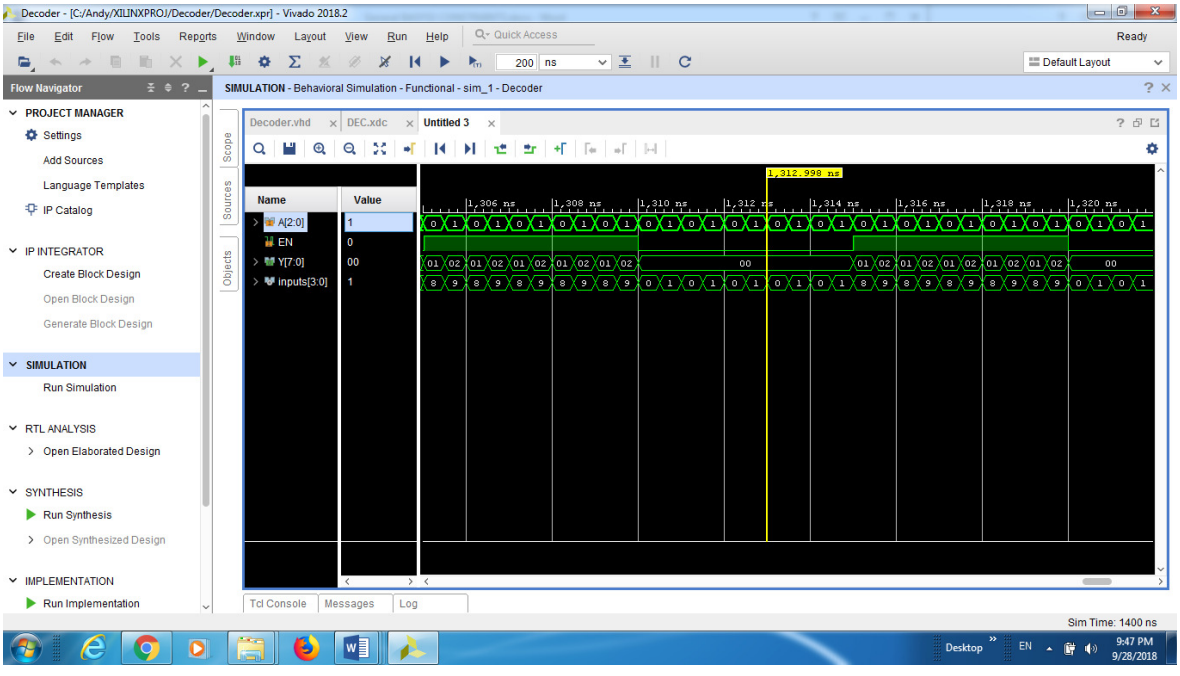
```
ENTITY Decoder IS
  PORT (A: in STD_LOGIC_VECTOR (2 downto 0);
       EN: in STD_LOGIC;
       Y: out STD_LOGIC_VECTOR (7 downto 0));
END Decoder;

ARCHITECTURE Behavioral OF Decoder IS
SIGNAL inputs: STD_LOGIC_VECTOR (3 DOWNTO 0);
BEGIN
 inputs <= EN & A;
  WITH inputs SELECT
     Y <= B"00000001" WHEN B"1000", -- Y0 active
          B"00000010" WHEN B"1001", -- Y1 active
          B"00000100" WHEN B"1010", -- Y2 active
          B"00001000" WHEN B"1011", -- Y3 active
          B"00010000" WHEN B"1100", -- Y4 active
          B"00100000" WHEN B"1101", -- Y5 active
          B"01000000" WHEN B"1110", -- Y6 active
          B"10000000" WHEN B"1111", -- Y7 active
          B"00000000" WHEN OTHERS; -- Decoder disabled
END Behavioral;
```

The decoder implementation is shown in the following figures with the simulation screenshot shown in Figure 7 and the implementation using board in Figure 8, respectively.

Table 1 shows the LEDs (outputs) (labeled L15,…,L0), the toggle switches (inputs) (labeled S15,…,S0) and their logic states (L7,…, L0 and S15, S2, S1, S0 used in the example) representing the LEDs and switches shown on the BASYS 3 board in Figure 8, inside the marked box.

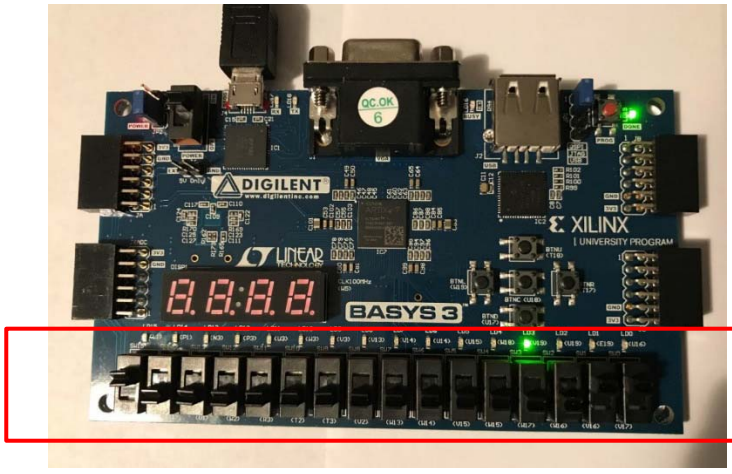
The 3 x 8 decoder has three input lines, A = A2A1A0 (switches S2, S1, S0), and enable line En (switch S15). Hence only the S15, S2, S1, S0 toggle switches are used for inputs. The decoder's eight output lines (Y7,…, Y0) are connected to board's eight LEDs (L7,…, L0), respectively. In the decoder example for input lines A2A1A0 = 011, with enable signal En = 1, the decoder activates output line Y3 connected to LED L3, as expected.

Figure 7. Simulation screenshot of the implemented decoder



Source: XILINX Software.

Figure 8. BASYS 3 board (with permission from Digilent, Inc.). Marked box shows the toggle switches as inputs (bottom row) and the LEDs above the last row as the outputs



Source: Digilent, Inc.

Table 1. Diagram of the BASYS 3 board LEDs (L16,..., L0) and toggle switches (S15,..., S0) – bottom part of the board, inside the marked box shown in Fig. 8

LED State									Off	Off	Off	Off	On	Off	Off	Off
LED	L15	L..	L..	L..	L..	L..	L..	L..	L7	L6	L5	L4	L3	L2	L1	L0
State	On													Off	On	On
Switch	S15	S..	S..	S..	S..	S..	S..	S..	S..	S..	S..	S..	S..	S2	S1	S0
Role	En													A2	A1	A0

Source: author's own work.

Conclusion

The objective of the article was two-fold: to present teaching examples of digital circuit analysis and design with the application of Digilent boards hosting Xilinx FPGA programmable chips and to discuss the hybrid or blended teaching delivery method used by the author. The current technology of programmable memories is being applied in engineering curriculum nationwide and consequently provides a pedagogical challenge to instructors concerning the most effective methods for subject coverage and delivery method, whether face-to-face or in a hybrid format with some element of e-learning.

The author in freshman-level digital design courses began with traditional discrete chip technologies and migrated towards PLDs with FPGAs through the semester work. Naturally, the pace of transition was usually dictated by the level of the course, either introductory or more advanced, and also by the prior exposure of the students to programming languages, including VHDL. The online component was usually used to deliver about 40% of the material focused on the introduction of general concepts, with face-to-face on-campus sessions to deliver the rest of the material in a more detail-oriented analysis.

As far as achieving teaching/learning objectives and the students' comprehension of the material were concerned, the author did not notice any significant difference between the standard complete face-to-face on-campus course delivery conducted in earlier years and the blended or hybrid format. In that, the author's experience did not confirm the results of the meta-analysis of the effectiveness of online education reported by Means et al. (2010). In the anonymous class survey, the students in their comments expressed appreciation of the flexibility and convenience offered by the blended form of course delivery.

The article shows how material related to digital circuit analysis and design courses can be taught effectively using hybrid or blended forms of course delivery. As such, the article addresses the increasingly important factor faced by higher learning institutions of how to respond effectively to the changing demographics of current students and their expectations for more flexibility in the learning modalities offered by a university.

Acknowledgment

The author would like to thank Digilent, Inc. Corporation for providing permission to publish images and specification data.

References

Ashenden, P. J. (2008). *The designer's guide to VHDL* (3rd ed). Morgan Kaufmann.

Collis, B., Bruijstens, H., & van der Veen, J. K. (2003). Course redesign for blended learning: modern optics for technical professionals. *International Journal of Continuing Engineering Education and Lifelong Learning, 13*(1/2), 22–38. https://doi.org/10.1504/IJCEELL.2003.002151

DASA. (2018). *Self-Reflective Techniques*. https://dasa.ncsu.edu/wp-content/uploads/sites/20/2018/05/04-Self-Reflection_2018.pptx.pdf

Dziuban, C. D., Hartman, J. L., & Moskal, P. D. (2004). *Blended learning*. Center for Applied Research EDUCAUSE. https://www.educause.edu/~/media/files/library/2004/3/erb0407-pdf.pdf?la=en

Gapinski, A. J. (2012). *Online education: An instructor perspective*. LACCEI (10th Latin American and Caribbean Consortium of Engineering Institutions) Conf. Proceedings. July 23–26. http://laccei.org/LACCEI2012-Panama/RefereedPapers/RP051.pdf

Gapinski, A. J. (2013). *Industrial automation: Teaching PLC class in a hybrid format*. Proceedings of IEMS, Cocoa Beach, FL. March 25–27 (pp. 77–81). https://www.dropbox.com/s/p7iklgmfc52cws3/2013%20Proceedings.pdf?dl=0

Gapinski, A. J. (2018). *Digital electronics with DIGILENT BASYS 2 & 3 FPGA boards*. Lambert Academic Publishing.

Gapinski, A. J. (2019). *Digital circuit design with DIGILENT FPGAs boards*. International Conference on Industry, Engineering, and Management Systems (IEMS), Clearwater Beach, FL. March 17–20.

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education, 7*(2), 95–105. https://doi.org/10.1016/j.iheduc.2004.02.001

Haskell, R. E., & Hanna, D. M. (2009). *Introduction to digital design using Digilent FPGA boards – block diagram / VHDL examples*. LBE Books.

Hardware description language (n.d.). In *Wikipedia*. Retrieved June 5, 2019 from https://en.wikipedia.org/wiki/Hardware_description_language

Karabulut Ilgu, A., & Jahren, C. T. (2015). *Faculty perspectives on benefits and challenges of hybrid learning*. American Society for Engineering Education. https://www.asee.org/public/conferences/56/papers/11902/download

Katz, R. H., & Borriello, G. (2004). *Contemporary logic design* (2nd ed.). Pearson.

Lamport, M. A., & Hill, R. J. (2012). Impact of hybrid instruction on student achievement in post-secondary institutions: A synthetic review of the literature. *Journal of Instructional Research, 1*, 49–58. https://files.eric.ed.gov/fulltext/EJ1127597.pdf

Lee, S. (1999). *Design of computers and other complex digital devices*. Prentice Hall.

Marcus, J. (2020, April 23). Will the coronavirus forever alter the college experience? T*he New York Times*. https://www.nytimes.com/2020/04/23/education/learning/coronavirus-online-education-college.html

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2010). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies*. U.S. Department of Education, Office of Planning, Evaluation, and Policy Development. https://www2.ed.gov/rschstat/eval/tech/evidence-based-practices/finalreport.pdf

Mano, M. M., & Ciletti, M. D. (2018). *Digital design with an introduction to the Verilog HDL, VHDL, and System Verilog* (6th ed.). Pearson Education.

Scarpino, F. (1998). *VHDL and AHDL digital system implementation*. Prentice Hall.

Turula, A. (2017). ICT goes university. Three ideas and their implementations. *e-mentor*, *3*(70), 33–46. https://doi.org/10.15219/em70.1305

Van den Bout, D. (1998). *The practical Xilinx designer lab book*. Prentice Hall.

Widmer, N. S., Moss, G. L., & Tocci, R. J. (2017). *Digital systems: Principles and applications* (12th ed.). Pearson Education.

Yalamanchili, S. (2005). *VHDL: A starter's guide* (2nd ed). Pearson.

Andrzej J. Gapinski is a Professor of Engineering at the Pennsylvania State University, Pennsylvania, USA. Dr. A. J. Gapinski received his Ph.D. in Electrical Engineering with a Minor in Industrial Engineering from Texas Tech University, Lubbock, Texas, USA in 1988. He obtained his master's degree in Electronics, Institute of Engineering Cybernetics, Wroclaw University of Science and Technology, Wroclaw, Poland in 1978. He also holds an International Business Certificate (Podyplomowe Studium Handlu Zagranicznego) from SGH Warsaw School of Economics. His research interests are in systems and control theory and applications, information science and technology, automation in manufacturing processes, project management, and pedagogy. He has over 60 refereed publications in various journals and conference proceedings. He recently published a book on digital design with FPGA technology. He consults for industrial and manufacturing companies in the area of industrial control and manufacturing processes.

Emilia Palankiewicz-Mitrut

Educational needs of adult Polish and Romanian high school students

Abstract

The purpose of the article is to show the educational needs and expectations of adult students towards their foreign language teacher. The paper presents the main aspects associated with the process of teaching English to Polish and Romanian adults who are being prepared for their final exams (in Poland – matura, in Romania – Examen de bacalaureat). In considerations related to adult education, it is necessary to pay attention to recent changes in the job market in both Poland and Romania. Nowadays it is important to speak at least one foreign language, with employers requiring an understanding of both general and specific job-related language. This is the main reason for increasing numbers of adults starting to learn foreign languages. It might also be noted that foreign language acquisition is one part of the process of lifelong learning.

For a teacher planning classes for adults, the considerations must also involve the differences between teaching children and adults, and the primary aspects that should be included in the planning process.

The methodological part of the article includes data analyses of a survey involving a group of young adults preparing for the English final exam at a high school for adults in Warsaw and at a high school in Bucharest.

The conclusions present considerations related to the educational needs of the young adult students who participated in the study.

Keywords: andragogist, adult education, adult students, lifelong learning, teacher, Matura Exam

Introduction

Taking into consideration the teaching of foreign languages to adults, it is necessary to pay attention to the main advantages of this activity. In the face of an aging population, an increasing number of adults in Poland and Romania decide to begin learning a foreign language (especially English). This phenomenon is mainly caused by significant changes in the job market and the growing requirements of employers as far as foreign languages are concerned.

It is undeniable that there is a significant need to learn English among all age groups; however, adult students have the capacity to learn a foreign language more effectively than children as they are more aware of the fact that they can make appropriate use of their knowledge.

Teaching English to children and adults – the main differences in language acquisition

Although children are a very capable group of students, as they are always ready to undertake new challenges, such as studying English at school or acquiring a language by learning it from their parents when they come from a mixed family (Arabski, 1985, p. 30), there are disadvantages that might limit their ability to gain new knowledge, for example: weak concentration, unstable memory, unawareness of learning strategies and undeveloped logic memory (making learning new grammar rules impossible). Children can be good "speakers and listeners" while their reading and writing skills are still undeveloped, which is a source of problems with self-study (Komorowska, 2005, p. 91).

Emilia Palankiewicz-Mitrut, Centrum Kształcenia Ustawicznego Nr 2, Poland, https://orcid.org/0000-0001-7586-3562

The process of adult education has some noticeable difficulties, as adults are also a very specific group of students. The main obstacles in learning a foreign language by adults are limited free time, fear of speaking and fear of making mistakes, associated with the fear of criticism (Komorowska, p. 37) from the teacher or other students. However, their retentive memory and competence in writing and reading are skills that let adult learners use different forms of study. What is more, adults can learn more easily, as they are able to organize their own work, monitor their educational results and utilize their far better cognitive capabilities and conceptual complexity than those possessed by younger students (Harmer, 2007, p. 81). Very significant is the fact that adults have some experience in learning and, contrary to children, they have already worked out their own learning strategies. These are helpful in their further education, allowing them to reach high levels of proficiency in learning English (Lightbown & Spada, 2006, p. 81).

It is possible to learn a foreign language at any age, despite the fact that at the beginning children may learn faster than adults. This is because their organs of speech are more flexible and "they are strongly motivated to become part of the first language community and require a native-like accent" (Ellis, 2015, p. 110); however, they can have problems with concentration and a lack of motivation. Therefore, one can conclude that adult students have the capacities to learn a foreign language more efficiently than children.

Planning an English course for adult learners

Nowadays, adult students in Poland have ever more opportunities to acquire new knowledge, such as by participating in English courses, vocational training (e.g., business English courses), individual learning, learning on the internet (e-learning) etc. (Frąckowiak, 2006, p. 82).

The situation is similar in Romania, as the educational needs of adults result from the requirements of the current labor market (Popovici, 2012).

Lifelong learning develops individual and social features in students (Gerlach, 2007, p. 55), and therefore it is important to remember that foreign language acquisition in the aspect of adult education is a complex process that requires systematic work and commitment from all participants. Adult students form a demanding group as they attend the classes because they want to, not because they have to. Their expectations and educational needs are diverse, and hence the teacher should develop an individual approach to each student, concentrating on the whole process of language acquisition rather than just the product of the classroom activities, e.g. not on the results of the listening activities, but on the listening itself (Field, 1998, p. 111).

If adult students have a positive attitude to the process of language acquisition, it is much easier for the teacher to motivate them and encourage them to further learning (Komorowska, 2005, p. 36). In adult education the main role of the teacher is to pay attention to the needs of communication, which is the result of the individual situations of the students. The motivation to study a foreign language is closely related to vocational plans for the near future, e.g. career change, business travel, challenging tasks or some new opportunities. Adult learners have some expectations: sometimes they only want to focus on vocabulary and speaking because they plan to go abroad, and do not see the necessity to develop any other skills.

It is undeniable that there is a great need to learn English among all age groups. In considering the teaching of foreign language to adults, we may conclude that a group of adults is not as problematic as a group of children. Older students are more disciplined and willing to gain new knowledge (Harmer, 2007, p. 84), as they are more aware of their obligations and necessities. Therefore, the decision to take an English course is mostly the result of their willingness and inner motivation. According to the theory of Knowles, an American pioneer of andragogy, "As a person matures the motivation to learn becomes internal" (Knowles, 1984, p. 12). Adults decide to participate in the process of education as they seek a wide variety of educational goals, to develop some new skills and to achieve qualifications (Adult education, n.d.).

The teacher should not forget that there are some restrictions and difficulties connected with the process of language acquisition. Adults do not have enough time to spend on learning English due to work and family obligations. This is the main obstacle to studying a foreign language systematically. In a situation where a group of adults includes some students that do not attend the classes regularly, the teacher should (Komorowska, 2005, p. 36):

- plan each lesson separately so that all students can take part in the classes actively, regardless of whether they attended the previous lesson or not;
- start all classes by revising and consolidating the previous material;
- provide additional materials.

Students might insist on applying traditional teaching methods that they remember from the past, e.g. reading combined with translating, or explaining the meaning of each word from the text. Sometimes adults have some problems in establishing their language preferences and are unable to inform the teacher about their general expectations and the main aims of learning English. In this situation the teacher should:

- inform the learners during the first class about the general purpose and the main principles of the course;

- explain what new skills they will acquire during the course;
- present the learners with the most significant techniques for learning English along with their good and bad points;
- ask the students about their expectations concerning the methods of learning a foreign language;
- define the method of work during the course;
- be able to adapt to the individual needs of the students (especially when any difficulties arise).

Adults who have different occupations may feel uncomfortable to be managed by a teacher. Mature students form a specific group, one which may not like being criticized by the teacher or other students.

In this situation the teacher should:

- be tactful while correcting students' mistakes;
- not interrupt the learner's presentation;
- try to encourage shy students to participate in group or pair work;
- treat all students with respect and understanding.

The teacher should always remember that the student is the most important element of the process of teaching and learning a foreign language. On the other hand, the student may need to be convinced that it is never too late to start learning English, and that their age is not an obstacle. What is more, the student's maturity is closely related to their life experience, which might be very helpful in further education (Komorowska, 2005, p. 37)

Research into adult students on their expectations related to teaching methods

The process of learning a foreign language requires contributions both from the students and the teacher. As mentioned before, adult learners are aware of their educational needs and expectations, as they already have career development plans where a knowledge of a foreign language is essential.

The educator's role is to understand the individual needs of each student. The teacher should encourage the learners to participate actively in the process of language acquisition by asking questions, motivating them to develop solutions for problematic situations, giving useful information as well as clarifying some language difficulties. The teacher should also take into account that these activities must be adapted to the needs, age and vocational plans of adults (Herr et al., 1979, p. 259).

It should not be forgotten that the teacher has to motivate the students to undertake further education, related to the basis of their individual career development. A number of adults who develop their skills by taking part in some educational programs need an instructor, a trainer or, in general, an educator, one who can show them the most suitable methods of self-development (Keierleber & Sundal-Hansen, 1985).

Purpose of the research

The survey, one of the most common research methods, is also the most convenient way to reach a large group of students, whether in Poland or abroad. Thanks to it, the researcher is able to obtain results in a relatively short time. It was considered that for this study, involving a larger group of students, this research method would be the most appropriate.

The study was based on a group of Polish and a group of Romanian students preparing for the final English exam at a high school for adults in Warsaw and a high school in Bucharest. Both groups were taught by professional English teachers, and the students attended classes four times a week. The Polish students were 18–27 years old, while the Romanian students were 18–19 years old.

The study took place in September 2019 in Warsaw and in November in Bucharest. It involved an English lesson in which the teacher presented the main objectives of the study, distributed questionnaires to the students and asked them to complete them anonymously. Before filling out the survey, they were asked to carefully read the questions and options for answers. Students were also informed that if they had any problems then they should ask their teacher for clarification.

Data comparison

A total of 100 completed questionnaires were selected randomly for the comparison and data analysis (50 from Poland and 50 from Romania), from a total of 134 participants in the study.

The survey contained 16 questions, all of which were closed to allow only one answer to be selected. The first nine questions asked the students about their English education, related to their attitude to learning a foreign language and their plans connected with English. The students were also asked what they value most about their English lessons and which activities and educational methods were the most suitable for them. Moreover, they had to evaluate the level of their English skills.

Table 1. Students' responses to questions 1–9

1. Do you like learning English?	Polish vs. Romanian students	
Yes	76% (38 students)	58% (29 students)
No	4% (2 students)	8% (4 students)
Not sure	20% (10 students)	34% (17 students)

2. Why would you like to speak English (the main reason)?	**Polish vs. Romanian students**	
I need it for work	64% (32 students)	32% (16 students)
I would like to communicate	16% (8 students)	8% (4 students)
I need it for the final exam	20% (10 students)	60% (30 students)
3. Are English lessons interesting? Why?	**Polish vs. Romanian students**	
Yes, because of the interesting topics	50% (25 students)	62% (31 students)
Yes, because the teacher gives lots of interesting materials	22% (11 students)	34% (17 students)
No, they are not interesting	28% (14 students)	4% (2 students)
4. Does the atmosphere during the lesson influence the quality of learning?	**Polish vs. Romanian students**	
Yes	84% (42 students)	96% (48 students)
No	4% (2 students)	0% (0 students)
Not sure	12% (6 students)	4% (2 students)
5. What activity do you like most in English lessons?	**Polish vs. Romanian students**	
Conversation	60% (30 students)	54% (27 students)
Reading	4% (2 students)	8% (4 students)
Listening	6% (3 students)	16% (8 students)
Grammar practice	2% (1 student)	10% (5 students)
Work in pairs	28% (14 students)	12% (6 students)
6. Which of the following is the most useful to you?	**Polish vs. Romanian students**	
Conversation	58% (29 students)	42% (21 students)
Reading	12% (6 students)	10% (5 students)
Listening	8% (4 students)	10% (5 students)
Grammar practice	10% (5 students)	24% (12 students)
Work in pairs	12% (6 students)	14% (7 students)
7. How good are your English skills?	**Polish vs. Romanian students**	
Very good	14% (7 students)	6% (3 students)
Good	44% (22 students)	50% (25 students)
Quite good	22% (11 students)	30% (15 students)
Unsatisfactory	20% (10 students)	14% (7 students)
8. Which of the following methods is the most effective in your case?	**Polish vs. Romanian students**	
Lecture	6% (3 students)	18% (9 students)
Translations	4% (2 students)	10% (5 students)
Work in pairs/groups	10% (5 students)	12% (6 students)
Tests	18% (9 students)	12% (6 students)
Grammar practice	6% (3 students)	28% (14 students)
Conversation	56% (28 students)	20% (10 students)
9. Does the pace of the lesson matter to you?	**Polish vs. Romanian students**	
Yes	82% (41 students)	96% (48 students)
No	4% (2 students)	0% (0 students)
Not sure	14% (7 students)	4% (2 students)

Source: author's own work.

The next four questions were to determine the role of the foreign language teacher, if their presence and activity during the classes is important for the students, and the expectations concerning the adult students in terms of the teacher's attitude.

Table 2. Students' responses to questions 10–13

10. Do you think that the teacher should demand hard work from the students?	**Polish vs. Romanian students**	
Yes	72% (36 students)	88% (44 students)
No	6% (3 students)	6% (3 students)
Not sure	22% (11 students)	6% (3 students)
11. Which do you value more:	**Polish vs. Romanian students**	
Individual work	16% (8 students)	28% (14 students)
Teacher-led work	84% (42 students)	72% (36 students)
12. What personal feature of the teacher do you value most?	**Polish vs. Romanian students**	
Tolerance	34% (17 students)	10% (5 students)
Fairness	16% (8 students)	56% (28 students)
Honesty	38% (19 students)	14% (7 students)
Kindness	12% (6 students)	20% (10 students)
13. Do you think that grades are motivating?	**Polish vs. Romanian students**	
Yes	88% (44 students)	90% (45 students)
No	8% (4 students)	2% (1 student)
Not sure	4% (2 students)	8% (4 students)

Source: author's own work.

The last three questions were to show how the students are involved in the process of language acquisition. What should be typical for a group of adult learners is the practical skill of combining teacher-led education and self-education. Thanks to this combination the adult learners have the possibility of developing their language skills and becoming more independent.

Table 3. Students' responses to questions 14–16

14. Do you think that systematic work improves your language skills?	**Polish vs. Romanian students**	
Yes	92% (46 students)	98% (49 students)
No	2% (1 student)	0% (0 students)
Not sure	6% (3 students)	2% (1 student)
15. How much time do you spend outside school on learning English?	**Polish vs. Romanian students**	
1 hour a day	20% (10 students)	44% (22 students)
1 hour a week	50% (25 students)	42% (21 students)
1 hour a month	22% (11 students)	10% (5 students)
Less than 1 hour a month	8% (4 students)	4% (2 students)
16. Do you think that you spend enough time on learning English?	**Polish vs. Romanian students**	
Yes	28% (14 students)	24% (12 students)
No	28% (14 students)	20% (10 students)
Not sure	44% (22 students)	56% (28 students)

Source: author's own work.

Data analysis

Both Polish (76%) and Romanian (58%) adult students had a positive attitude towards learning English. However, it should be noted that for many years in Romania the first foreign language taught in schools was French, which along with Italian is very common there and the probable cause of the significant number of Romanian respondents (34%) who were undecided when asked about their language preferences.

When asked about the reasons for learning English, the majority of students from Poland (64%) answered that they were guided by professional reasons. In contrast, Romanian students primarily learn English to pass the final exams (60%). Differences in the choice of answers between the groups of students from Poland and Romania may be related to the types of schools they attended. The group of students from Poland studied in a high school for adults, where learning is often combined with the work they do every day, and therefore their need for language skills may be for professional purposes. The high school students from Romania spent most of the week at school, and therefore a well-passed final exam is currently their main objective. This raises the question of how much time the students spent learning English outside of school – where most Romanian students (44%) declared that they study a foreign language one hour a day, while most Polish students (50%) devoted one hour a week to studying English. It is also worth noting that the majority of the surveyed students from both groups were not sure if they spent enough time on learning English (44% of Poles, 56% of Romanians).

For most students from Poland (72%) and Romania (96%), English is an interesting subject, underlying the importance of a positive atmosphere during lessons and an appropriate pace by the teacher. As for the preferences regarding the educational methods used during the classes, both Polish (60%) and Romanian (54%) students considered that conversation was the most preferred form of activity in classes (vs. reading, listening, grammar practice, work in pairs).

The students from each country had a positive attitude towards learning English at school. Most of them appreciated the teacher's contribution and claimed that teacher-led work brought greater results than individual study (84% of Polish and 72% of Romanian young students preferred to work under the guidance of a teacher). Moreover, they believed that the teacher should be demanding of their students (72% of Polish students, 88% of Romanian students thought that the teacher ought to demand hard work from them). In response to the question about the most significant qualities that the teacher should have, most Romanian students chose fairness (56%), while the most important qualities for Polish students were tolerance (34%) and honesty (38%).

Both groups of young adults (44% of Polish students, 50% of Romanian students) believed that their English skills were at a good level, which undoubtedly encouraged them to continue learning the foreign language. An important aspect in the process of education for the respondents were the grades, which were viewed as feedback from the teacher about their progress (88% of Poles and 90% of Romanians said that the grades motivated them).

Conclusions

The main aim of the research was to check the students' attitude towards learning a foreign language, their individual language needs, internal motivation, the necessity for self-development and their expectations about a foreign language teacher.

It should be noted that both study groups attended different types of schools, and although they studied at the same level, learning might be prioritized differently due to the varied professional and family situations (the students from Poland were slightly older, some of them already had their own families and, as a result, spent less time studying). Due to the type of school the respondents attended, it may be concluded that the Polish students attended a school for adults to study English mainly for professional reasons, as this may be required by their employer for the work they do outside school hours, while the Romanian high school students studied English to achieve the best results in the final exam (educational reasons), which is also related to the fact that they attached more importance to the systematic study of a foreign language.

The students from Poland and Romania valued the help from the teacher, the positive attitude towards them as participants of the learning process and the atmosphere during the classes, which certainly affects the efficiency of their work.

Appropriate selection of the educational methods during classes is also an important factor influencing the effectiveness of learning a foreign language. The respondents preferred conversation, which is the proof that they want to learn the language through active participation in classes, they are not withdrawn and certainly prefer to spend time talking with the teacher or other participants than in solving grammar tests and exercises. Adults often think that conversation during courses or classes at school form a fully sufficient form of learning a foreign language. This approach is often caused by a negative experience related to learning a foreign language at school. If, as children, the students first had to listen to the teacher, learn grammar rules and then do the tests themselves, they now want the teacher to take a slightly different role and motivate them in their process of learning by the use of guidance and activating techniques.

Most of the answers given by students from Poland and Romania were comparable. The students had similar expectations towards the teacher and the way English lessons were conducted. The results of the study clearly indicate that the teacher occupied a very important place in the adult learning process.

Active and lively teaching, appropriate selection of educational means and methods, and appropriate adjustment of the pace during lessons are all a response to the needs of the students that still exist despite the fact that they are no longer children but young adults, consciously participating in language learning.

Students from both countries eagerly participated in their English classes, while the discrepancies in the responses in the study were primarily due to the type of school they attended, rather than the country in which they lived.

There is no doubt that learning foreign languages (especially English) is a thing of the future. Education has become a requirement for functioning in the modern world, and brings with it new challenges (Półturzycki, 2008). However, it should be considered that the effectiveness of language acquisition depends on the involvement of both sides: student and teacher. The student is always at the center of the process of learning a foreign language, while the teacher should seek to create favorable conditions that allow the student to learn English more willingly and effectively.

References

Adult education. (n.d.). In *Encyclopedia*. Retrieved March 16, 2020 from https://www.encyclopedia.com/social-sciences-and-law/education/education-terms-and-concepts/adult-education

Arabski, J. (1985). *O przyswajaniu języka obcego (drugiego)*. WSiP.

Ellis, R. (2015). *Understanding second language acquisition*. Oxford University Press.

Frąckowiak, A. (2006). Internet jako medium ustawicznego uczenia się języków obcych. *Rocznik Andragogiczny*, 80–85.

Field, J. (1998). Skills and strategies: towards a new methodology for listening. *ELT Journal*, *52*(2), 110–118. https://doi.org/10.1093/elt/52.2.110

Gerlach, R. (2007). Ustawiczne kształcenie się w kontekście społeczeństwa wiedzy. In Z. Wiatrowski, & K. Ciżkowicz (Eds.), *Pedagogika pracy i andragogika z myślą o dorastaniu, dorosłości i starości człowieka w XXI wieku* (pp. 54–76). WSHE-WTN.

Harmer, J. (2007). *The practice of English language teaching*. Pearson Longman.

Herr, E. L., Cramer, S. H., & Niles, S. G. (1979). *Career guidance and counseling through the lifespan. Systematic approaches* (6th ed.). Little, Brown and Company.

Keierleber, D. L., & Sundal-Hansen, L. S. (1986). Adult career development in University settings. Practical perspectives. In Z. Leibowitz, & D. Lea (Eds.), *Adult career development* (pp. 249–271). National Career Development Association.

Knowles, M. (1984). *Andragogy in action. Applying modern principles of adult education*. Jossey-Bass.

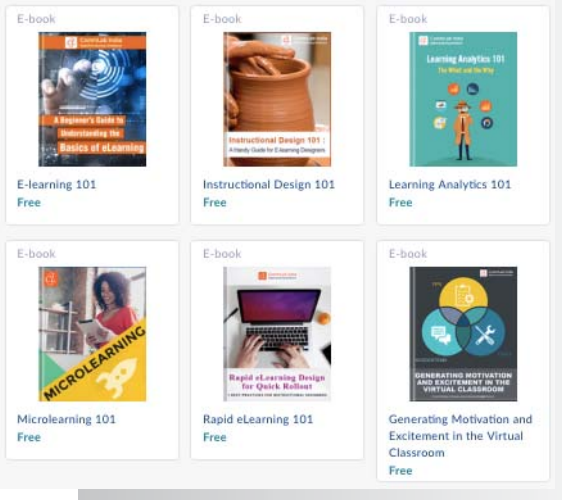
Komorowska, H. (2005). *Metodyka nauczania języków obcych.* Fraszka Edukacyjna.

Lightbown, P., & Spada, N. (2006). *How languages are learned*. Oxford University Press.

Popovici, A. (2012). Education system, labour market and education system graduates employment in Romania. *European Research Studies, 15*(2), https://www.ersj.eu/repec/ers/papers/12_2_p7.pdf

Półturzycki, J. (2008). Edukacja ustawiczna w ujęciu Roberta Kidda, Jacques'a Delorsa i Polskiej Strategii z 2003 roku. In S. M. Kwiatkowski (Ed.), *Edukacja ustawiczna. Wymiar teoretyczny i praktyczny* (pp. 69–84). Instytut Technologii Eksploatacji – Państwowy Instytut Badawczy.

Emilia Palankiewicz-Mitrut is a graduate of pedagogy (andragogical specialization) and law. She is a pedagogue-practitioner with experience in working with children, adolescents, and adults. For six years she has been working at a Warsaw high school for adults, where she encounters everyday problems related to the educational needs of adult students. The author's scientific interests include the work of young people who have to combine their school and professional activities, as well as the differences in the acquisition of a foreign language by children and adults.



We recommend

Beginner series on online learning: must-read eBooks

The Rosetta stone offers for free six eBooks that cover everything from the advantages of eLearning and the business goals it helps achieve to how to plan for learning analytics, the role of an LMS, and everything within the spectrum. The titles of the books are E-learning, Instructional Design, Learning Analytics, Microlearning, Rapid eLearning, and Generating Motivation and Excitement in the Virtual Classroom. The advantage of those books is that they are well structured and concise. One may easily get the overview of the issues covered and then identify what he or she wants to deepen from other sources.

The eBooks can be downloaded from the CommonLab website **https://bit.ly/2Cya7t2** (the books are free but the registration is required)

Katarzyna Nowicka

Supply chain management in the access economy environment

Abstract

The paper focuses on the digital platform being the driving force of development of the access economy impacting on supply chain business model reconfiguration. First, the main accelerators of the sharing and access economies were described and compared with the characteristics of supply chain architecture. Then, different solutions of the platform business model impacting on supply chain reconfiguration are analysed. Next the results of a pilot study are presented to illustrate how supply chain managers understand the role of digital technologies and platforms. The paper is based mainly on a literature review and partially on the results of a pilot study conducted at the end of 2018 among 120 supply chain managers using the CATI methodology. Digital platforms can be used to improve supply chain competitiveness in several ways – starting from access to logistics services using the outsourcing model, through the additional solution of the supply chain business model portfolio widening the range of distribution channels, up to the digital supply chain solution being a platform connecting the whole ecosystem of supply chain stakeholders. The paper has a conceptual character, and the proposed solutions are still at the early stage of implementation in practice. Therefore, the undertaken topic should be a subject of further studies.

Keywords: digital supply chain, platform business model, access economy, digital technologies, supply chain as a platform

The sharing and digital economies have started to be one of the most important trends impacting on companies and the development of their supply chains. Both of them create new conditions for competitive advantages that are influencing the directions of supply chain reconfigurations and their further improvements. One can argue that the sharing economy has been developing for ages and should not be considered to be a new solution. However, the current phenomenon of the diffusion of the sharing economy results from the wide availability of digital technologies – the major determinant in the spread of the digital economy on a global scale – which were not accessible on such a scale even a decade ago.

Therefore, it is important to analyze the circumstances of the development of the sharing economy in terms of identifying new conditions for supply chain competitiveness. At first glance, it is quite easy to indicate several factors that describe both in a similar way – the sharing economy and supply chain. There are, i.e. the need to share information, connection of the demand and the supply sides, and crating network effects. At the same time, there are a number of other characteristics of the sharing economy that might strongly impact supply chains and should not be omitted during the competitive struggle.

Sharing and access economy concepts and the platform business model

The sharing economy has been widely hailed as a major growth sector. This is mainly due to the fact that it has disrupted mature industries, such as hotels and transport, by providing convenient and cost-efficient access to resources without the financial, emotional, or social burdens of ownership (Eckhardt & Bardhi, 2015).

Katarzyna Nowicka, SGH Warsaw School of Economics, Poland, https://orcid.org/0000-0001-7830-7457

However, one can argue that sharing has been known for ages as a form of social exchange that takes place among people known to each other, without any profit. According to Giana Eckhardt and Fleura Bardhi (2015), when "sharing" is market-mediated – when a company is an intermediary between consumers who don't know each other – it is no longer sharing at all. Rather, consumers are paying to access someone else's goods or services for a particular period of time. It is an economic exchange, and consumers are after utilitarian, rather than social, value. Therefore, the access economy would be a term that is more precisely defining the phenomena of developing new business models – describing the way that a firm creates and delivers value to its consumers (Teece, 2010) – in today's business environment.

The new business models of the access economy – platforms – are growing based on the diffusion of digital technologies (Nowicka, 2016a). Digital technologies change the economics of doing business at a global level in several ways. The digital platforms are global in scope, and they are driving down the cost of cross-border communications and transactions, connecting demand and supply in any country. Globalization was once reserved for large, multinational corporations, but these platforms reduce the minimum scale needed to go global, enabling small business and entrepreneurs around the world to participate. As a result, new types of competitors can emerge rapidly, increasing pressure on industry incumbents. In many cases, the number of active users of online platforms are comparable or higher than the populations of countries (Kemp, 2020; Manyika et al., 2016). This situation will be even more significant due to the changes in the behavior of customers impacted by the COVID-19 pandemic (Marzantowicz et al., 2020).

Additionally, the platforms can be used for coordination, which refers to the use of digital networks to coordinate economic transactions in an algorithmic way. This means that platforms are digital networks (a 'space' where goods or services can be offered or requested. These online spaces systematically collect, organize and store large amounts of data about the users and transactions) that coordinate transactions in an algorithmic way (matching and coordinating transactions in an automated way. The algorithms provide a governance structure to the platforms, incorporating encoded rules as well as automated monitoring and enforcement mechanisms) (Eurofround, 2018).

Among broadly analysed classification criteria of the platforms, the following can be highlighted (Eurofround, 2018):

1. Platform ownership: privately owned platforms, generally for-profit businesses (Uber, Airbnb), and platforms which are commonly owned by their users (Blockchain). Private platforms generate revenue by charging a fee or percentage of the value of each transaction; but in some cases, they can charge entry fees or generate revenue by displaying ads.
2. Economic nature of transactions: commercial and non-commercial transactions. The category of platforms for non-commercial transactions corresponds most directly with the original idea of the sharing economy, where goods and services are shared (Couchsurfing) or exchanged (Simbi) rather than bought. Even if the transactions are non-commercial, the platforms themselves can be for-profit businesses, generally generating revenue by subscription fees or advertisements (Couchsurfing).
3. Content of transactions: for the exchange of goods (Ebay, Amazon Marketplace) and for the exchange of services (Uber, Airbnb, Taskrabbit). Service platforms can be further differentiated as online vs. local: Commercial service online platforms correspond to the concept of crowd work (Mechanical Turk), whereas commercial platforms providing personal local services are often referred to as the gig economy (Taskrabbit) and types of tasks involved: physical (Taskrabbit), intellectual (Mechanical Turk), social (Bubble).

There are many types of platform business models, including search, communication, social media, matching, content and review, booking aggregator, retail, payment, crowdsourcing and crowdfunding, etc. (Figure 1)

Additionally, platforms can be combined (i.e. a social media platform can integrate communications, contents, retail and payment functions) (Wirtz et al., 2019) or built as a hybrid model. Table 1 presents examples of the main characteristics and earning models of the chosen retail platforms that strongly impact the competitive environment.

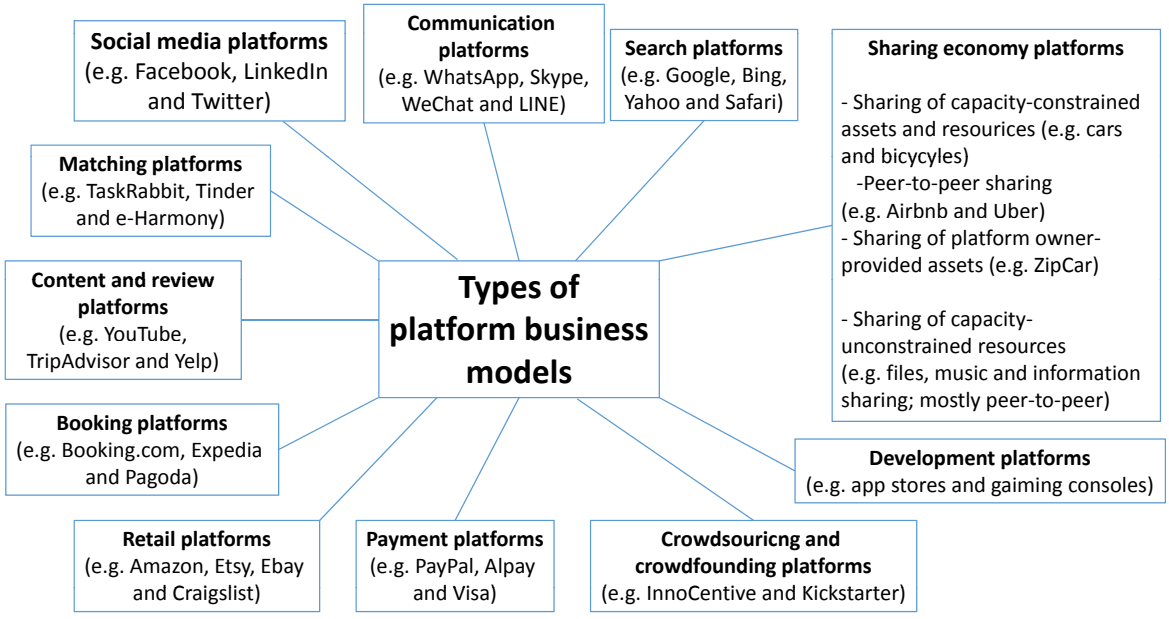
The platform business model changes the meaning of leading organizations, forcing them to re-think their strategies, way of competing, leadership, organizational structures, and approaches to value creation and capture systems. Aiming to become a platform leader entails a vision that extends beyond one's own company and aims to build and sustain an ecosystem of partners, where the platform leader has to be the equivalent of a captain (Evans & Gawer, 2016). Example of stakeholders involved in the platform ecosystem is presented in Figure 2.

Concentrating on the analyses of the platform business model, one can indicate several key aspects that characterize this solution. There are:

- creating network effects,
- connecting demand with supply,
- competing based on economies of scale effects,
- connecting a large group of stakeholders on a global scale.

All of the above effects result from the features of digital technologies and their broad usage by consumers. It can be also observed that those characteristics are comparable to the integrated supply chains architecture.

Figure 1. Types of platform business models



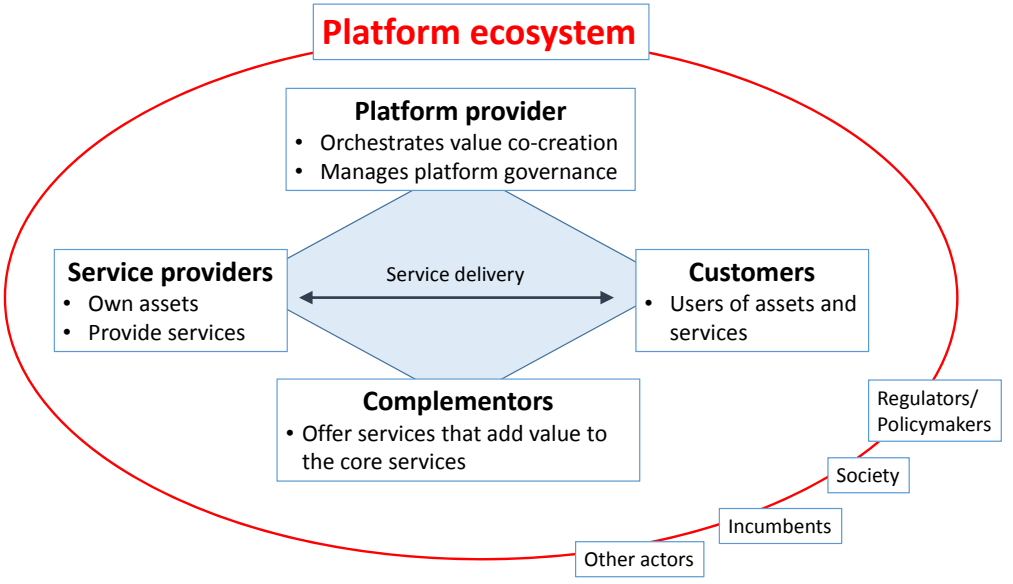
Source: Wirtz et al., 2019.

Table 1. Characteristics and earnings models for Alibaba Group, Amazon.com, eBay and Rakuten Ichiba

	Alibaba Group	Amazon.com	eBay	Rakuten Ichiba
Type of platform(s)	B2B, B2C and C2C platforms	B2C marketplace	C2C and B2C platforms	B2C platform
Market value (Forbes, May 2017)	$264.9 billion	$427 billion	$36.6 billion	$15.2 billion
Year founded	1999	1994	1995	1997
Headquarters	Hangzhou, China	Seattle, USA	San Jose, USA	Tokyo, Japan
Number of employees (2016)	36,450	341,400	36,500	14,134
Gross merchandise value (GMV) (2014/2015)	$476 billion	$225.6 billion	$81.7 billion	$64 billion
Number of commission-based suppliers (2016)	China B2B platforms: 830,000 International B2B Platforms: 136,000 China B2C platforms: 10 million	2 million	25 million	40,000
Number of registered shoppers (2016)	385 million	270 million	167 million	106 million
Average commission	Alibaba.com 0% 1668.com 0% Taobao 0% Tmall 0.3–5% Aliexpress 5%	6–20%	8–15%	8–10%
Other earnings models	Upgraded membership packages Data analytics Digital marketing Sales consultancy Affiliate program Ecosystem services (banking, travel, etc.)	Own sales Digital marketing Ecosystem services (Amazon Prime, Amazon Fresh, etc.) Amazon Web Services products (Kindle, Echo, etc.) Supplier services (distribution, payments, etc.)	Digital marketing	Digital marketing Sales consultancy Ecosystem services (banking, travel, etc.)
Supply chain	Outsourced to affiliated logistics partner Cainiao	394 global logistics facilities (MWPVL 2017), primarily outsourced delivery	Outsourced to third-party providers	Outsourced to third-party providers

Source: Hänninen et al., 2018.

Figure 2. Stakeholders involved in the access economy platform ecosystem



Source: Wirtz et al., 2019.

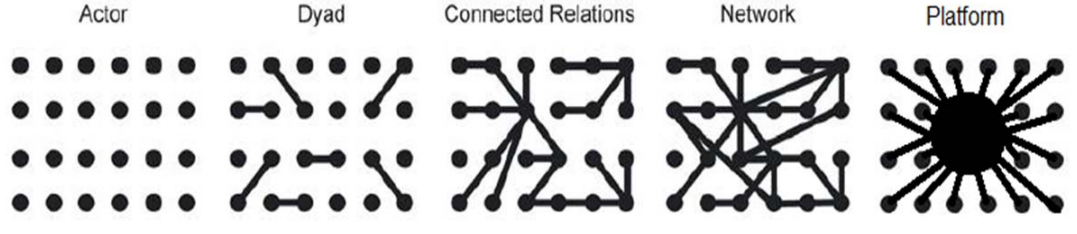
Supply chain and the platform business model

The supply chain is "a network of connected and interdependent organizations mutually and co-operatively working together to control, manage and improve the flow of the materials and information from suppliers to end users" (Aitken, 1998). One can mark an equal sign between this definition and the idea of a platform described in the previous section. However, supply chain management is definitely a more complex and multifaceted problem. First of all, integrated supply chain management covers the cooperation of many independent companies aiming to get the right product in the right way, in the right quantity and the right quality, at the right place, at the right time, and at the right cost (Mangan & Lalwani, 2016). But, the growing complexity of the supply chain, greater volatility in demand, disruptive technological changes, and the shortening lead-times of supply chain processes are making it increasingly difficult (Christopher & Holweg, 2017; Fore et al., 2017). In such conditions, access to information is a key success factor in supply chain management (Chopra & Meindl, 2013). Therefore, to improve competitiveness, the integration process must be developed between partners. The main conditions for supply chain integration are assumptions about partnership, trust, information transparency and the proper sharing of the risk and benefits between its stakeholders.

Except for sharing sensitive information (such as profits and losses), companies that collaborate within the supply chain share different types of logistics resources (i.e. plants, transport and warehouse space in cooperation with logistics service providers), knowledge, or even people (Ocicka & Wieteska, 2017). Since sharing profits and losses can be seen as characteristics of strategic cooperation or partnerships within a supply chain (Nowicka, 2011), the sharing of resources seems to be rather a business-as-usual model for managing the supply chain smoothly. This is a situation where supply chain competitiveness is supported, i.e. by logistics service providers or information technology companies, so, using the outsourcing model (Nowicka, 2016b).

Integration between partners in the supply chain is a process of sharing different types of resources within the network of stakeholders. Figure 3 illustrates the

Figure 3. From the supply chain to the supply platform



Source: Nowicka, 2017.

evolution of complexity in the interconnected network of supply chain relationships, indicating the interplay between interconnectedness and complexity in the shift towards the new supply platform paradigm. Each dot represents a company (supplier, distributor, retailer, etc.), and this is where both stakeholders establish dyadic relationships. Due to technology development, whole supply chains can be 'moved' to cyberspace and developed on an internet platform based on a cloud computing environment. In this case, the platform enables information and money flows to be coordinated, but it can still only rarely be used for the distribution of goods (Nowicka, 2017). This new business model changes the approach from linear flows to one that allows simultaneous access to information by all stakeholders.

Digital supply chain as a platform business model

One of the solutions that might be revised as a new concept of how platforms can be used to improve supply chain competitiveness is the digital supply chain. The digital supply chain can be defined as a new supply chain business model based on the properties of digital technologies, which aims to provide greater value than the current method (a detailed literature review on the term is conducted in: Nowicka, 2019a). The concept of digital supply chains changes the current way of organizing flows – by reconfiguring them – and adds value to them in a diverse way.

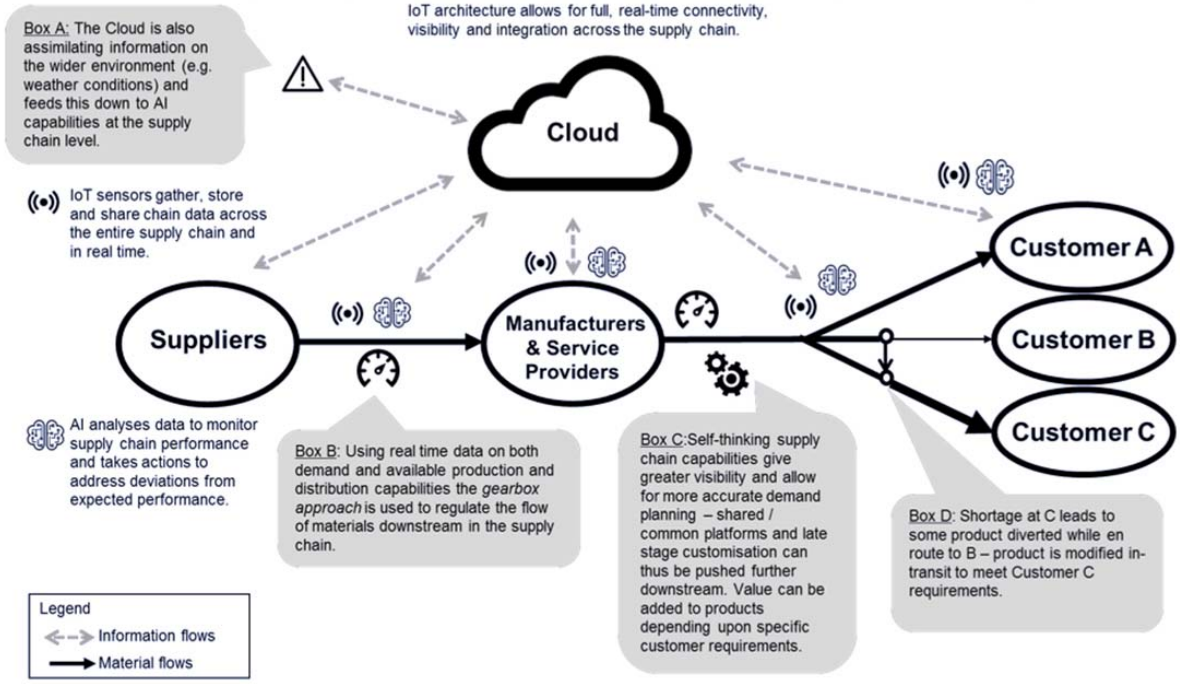
One example of a digital supply chain is the self-thinking supply chain developed by Augustina Calatayud et al. (2019) (Figure 4). This supply chain is based on a digital technologies ecosystem consisting of the Internet of Things (IoT), Artificial Intelligence (AI) and cloud computing (which in most cases is the base for the development of digital platforms) (Nowicka, 2016a). The increased connectivity amongst supply chain partners enabled by IoT, together with AI, allows, i.e. for more accurate demand forecasting, predictive maintenance and continuous optimization (Calatayud et al., 2019). A digital supply chain can be understood as a platform where data and information is crossed and exchanged between all stakeholders.

However, one can observe that such a solution is able to automatically coordinate all of the flows within the supply chain. Hence, nowadays, a digital supply chain based on the platform business model might be used mainly for standardized products or solutions where all of the flows are rather stable. In other cases, where the risks are more difficult to predict or the demand fluctuations are uncertain, a human factor within the supply chain management will be still dominate.

Platform business model as a link in the supply chain

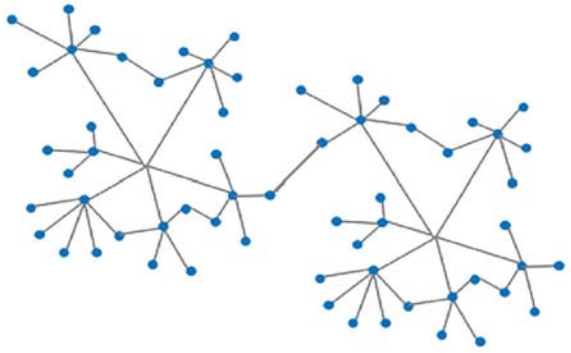
The introduction of the digital supply chain could be a domain of integrated supply chains where stakeholders are willing to share sensitive information. However, it must be underlined that, in practice, most supply chains are not integrated (Nowicka, 2019a). Also, most of the transactions between companies belonging to the same supply chain are not based on

Figure 4. The "self-thinking" supply chain



Source: Calatayud et al., 2019, p. 10.

Figure 5. Platforms as a link in the supply chain network



Source: author's own work.

strategic partnerships. This might mean that companies are more likely to look for and use short-term market opportunities than to build long-term relations leading to deeper integration between their current partners.

At the same time, many companies are developing their supply chains according to the specific needs of their particular product portfolio. Therefore, the digital supply chain based on the platform business model can be dedicated to these assortments. It can also be a new solution replacing that which is currently used. Additionally, managers can use existing platforms such as Amazon and Allegro to distribute their value proposition. All of these concepts are defining platform-based business models as additional business models in the supply chain configuration portfolio helping to differentiate distribution (multichanneling) solutions.

Moreover, the platform business model can be dedicated to help, i.e. sharing logistics resources such as transport and warehouse space, and information on production capacity available in different locations. In most cases, this is the domain of logistics service providers, who serve as virtual logistics hubs for information integration, cross-docking and redirecting flows of goods.

In the above solutions, the platform business model could serve as a link in the supply chain (Figure 5).

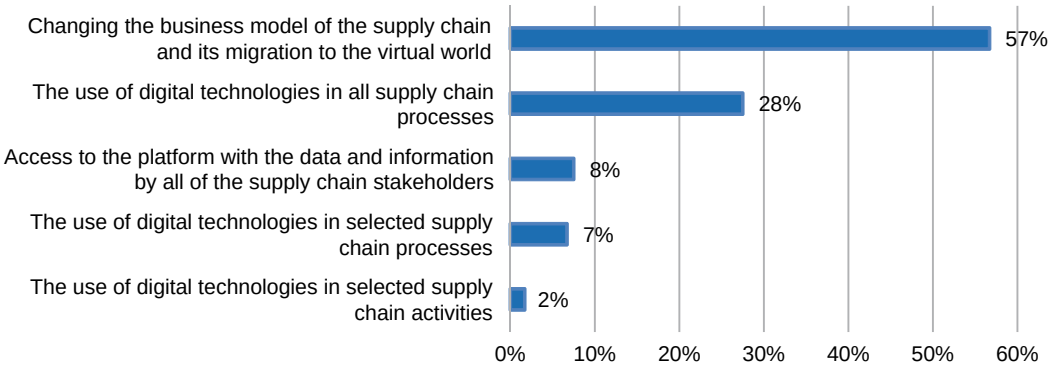
Digital supply chain and platform business model according to supply chain managers – results of pilot study

To identify the role of the access economy environment and the platform business model in supply chain management, it is worth analyzing the results of a pilot study conducted among supply chain managers. The research was undertaken in November and December of 2018 in Poland. Standardized questionnaire interviews (i.e. containing questions with a strictly defined order and unchanging wording, which were closed and had multiple choice answers) and the Computer-Assisted Telephone Interviewing (CATI) methodology were used. The sample was random. Contact was established with 1397 enterprises, and a representative number of 120 full interviews with supply chain and logistics managers were carried out. The response rate of completed questionnaires was 8.59%. The randomization algorithm built into the telephone testing software provided an equal chance for each of the records in the database to be in the sample. The presented results are part of an empirical study aimed at identifying the impact of digital technologies on supply chain transformation (Nowicka, 2019a). The following study results concentrate on the understanding and usage of the digital supply chain and platform business model by supply chain managers in Poland.

According to the research results, 57% of supply chain managers indicated that the digital supply chain is the concept of changing the business model of the supply chain and its migration to the virtual world. The second most frequently marked answer (indicated by 28% of the respondents) was "the use of the digital technologies in all supply chain processes." The third answer (8%) was connected with understanding the digital supply chain as an "access platform for data and information through all links in the supply chain." All of the results are shown in Figure 6.

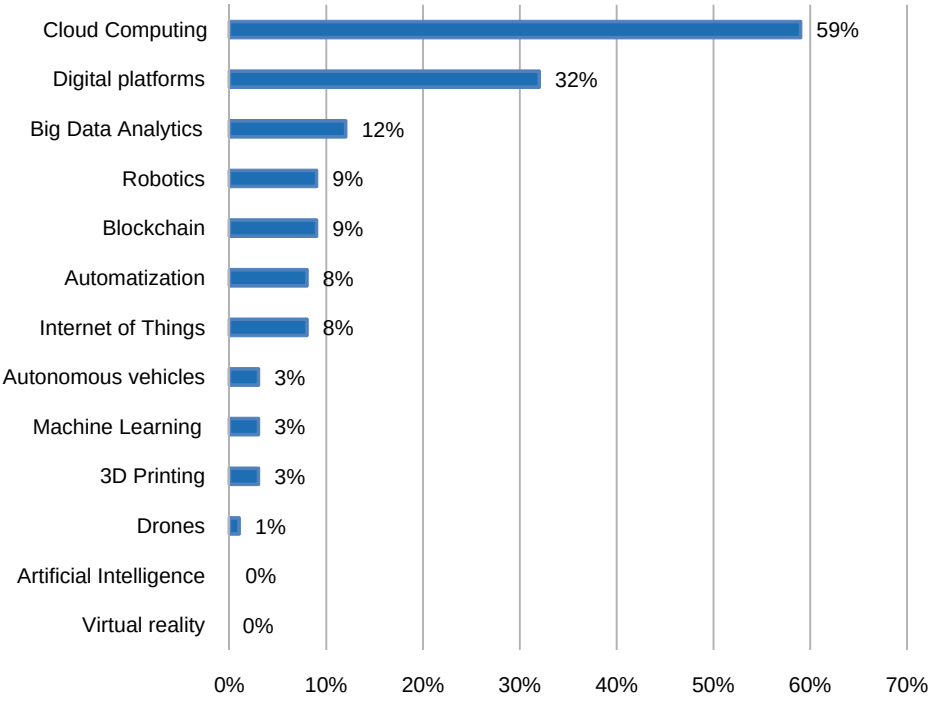
The managers are not identifying the digital platform directly with the digital supply chain. For them, the digital supply chain means the transformation of the current supply chain business model to the digital

Figure 6. Understanding of the digital supply chain by managers



Source: Nowicka, 2019a.

Figure 7. Digital solutions used in supply chain management



Source: Nowicka, 2019a.

one. They do not recognize the digital platform as a ready solution of the digital supply chain that could be delivered by, i.e. logistics service providers.

However, the results shown in Figure 7 underline the role platforms play in supply chain management – it was one of the most frequently chosen answers to the question concerning the usage of technologies or solutions in the supply chain. Digital platforms offering logistics services (i.e. transport or storage) was the second answer (after cloud computing), which was rated as the most frequently used solution in supply chain management. According to 32% of the respondents, digital platforms are the solutions which impact how the flows are managed.

The results shown in Figure 7 underlined the role of digital platforms in supply chain management on a daily basis. This could be understood as using platforms, i.e. for sharing resources between stakeholders. Keeping in mind competition in digital innovations (Nowicka, 2019b) by logistics service providers (Cichosz, 2018), further research on the business models of the digital platforms supporting supply chain competitiveness should be conducted. Especially in terms of distribution channel differentiation by accessing digital platforms.

Conclusions

The aim of the paper was to indicate the most important characteristics of the access economy and describe the ways the platform business model is impacting supply chain reconfiguration.

The access economy has a number of similarities to the characteristics of supply chains. Both of them are based on network effects, both share information and other resources between stakeholders. They connect demand with supply and use economies of scale effects. However, one of the most important differences that might impact supply chain competitiveness are digital technologies. They are still not that popular as a resource of supply chain management or an improvement tool for its competitiveness. At the same time, digital technologies are a base for the development of the access economy and a key element of the platform business model.

The results of the undertaken analysis show that, depending on the level of integration and the type of resources shared within a particular supply chain, digital technologies and digital platforms can impact supply chain reconfiguration in several ways and improve its competitiveness. They can have an influence, i.e. on:

- transformation of the company's business model,
- transformation of the supply chain business model (being a type of digital supply chain),
- developing the portfolio of the supply chain business models (multichannel),
- improving the range of available resources for supply chain management by being a supporting solution for the supply chain business model.

Digital platforms were presented as a base for developing new supply chain business models. This solution might also expand the portfolio of supply chain

business models, and function as an external support for improving existing supply chain management.

Based on a pilot study conducted on 120 supply chain managers at the end of 2018, it can be observed that digital platforms were mainly used as a solution supporting supply chain management in terms of differentiation of sourcing logistics services resources. At the same time, supply chain managers did not connect the concept of the digital supply chain with the platform business model. Based on the potential of the platform business model described based on a literature review, this might mean either that the supply chains are at an early stage of digital transformation with no clear outcome, or the digital platform is just a supporting solution. Due to these conclusions, there is a need for further research on the role of digital platforms in managing competitive supply chains in the access economy environment.

References

Aitken, J. (1998). *Supply chain integration within the context of the supplier association*. Cranfield University. http://dspace.lib.cranfield.ac.uk/handle/1826/9990

Calatayud, A., Mangan, J., & Christopher, M. (2019). The self-thinking supply chain. *Supply Chain Management, 24*(1), 22–38. https://doi.org/10.1108/SCM-03-2018-0136

Christopher, M., & Holweg, M. (2017). Supply chain 2.0 revisited: a framework for managing volatility-induced risk in the supply chain. *International Journal of Physical Distribution & Logistics Management*, *47*(1), 2–17. https://doi.org/10.1108/IJPDLM-09-2016-0245

Chopra, S., & Meindl, P. (2013). *Supply chain management: strategy, planning, and operation* (5th ed.). Pearson.

Cichosz, M. (2018). Digitalization and competitiveness in the logistics service industry. *e-mentor*, *5*(77), 73–82. http://dx.doi.org/10.15219/em77.1392

Eckhardt, G. M., & Bardhi, F. (2015, January 28). The sharing economy isn't about sharing at all. *Harvard Business Review*. https://hbr.org/2015/01/the-sharing-economy-isnt-about-sharing-at-all

Evans, P. C., & Gawer, A. (2016, January 14). *The Rise of the Platform Enterprise: A Global Survey*. The Center for Global Enterprise. https://www.thecge.net/archived-papers/the-rise-of-the-platform-enterprise-a-global-survey/

Eurofound. (2018). *Automation, digitisation and platforms: Implications for work and employment*. Publications Office of the European Union.

Fore, V., Khanna, A., Tomar, R., & Mishra, A. (2017). Intelligent supply chain management system. *Proceedings of the 3rd International Conference on Advances in Computing and Communication Engineering (ICACCE)*, Durban, November 28–29, 2016. (pp. 296–302). https://doi.org/10.1109/ICACCE.2016.8073764

Hänninen, M., Smedlund, A., & Mitronen, L. (2018). Digitalization in retailing: multi-sided platforms as drivers of industry transformation. *Baltic Journal of Management*, *13*(2), 152–168, https://doi.org/10.1108/BJM-04-2017-0109

Kemp, S. (2020, January 30). *Digital 2020: Global Digital Overview.* https://datareportal.com/reports/digital-2020-global-digital-overview

Mangan, J., & Lalwani, C. (2016). *Global logistics and supply chain management* (3rd ed.). Wiley.

Manyika, J., Lund, S., Bughin, J., Woetzel, J., Stamenov, K., & Dhingra, D. (2016, February 24). *Digital globalization: The new era of global flows*. McKinsey & Company. https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/digital-globalization-the-new-era-of-global-flows

Marzantowicz, Ł., Nowicka, K., & Pluta-Zaremba, A. (2020). *Zmiany w kanałach dystrybucji dóbr konsumpcyjnych wynikające z pandemii COVID-19 – perspektywa krótko- i średnioterminowa*. Ekspertyza dla Open Eyes Economy Summit.

Nowicka, K. (2011). Współpraca partnerska w łańcuchu dostaw. *Gospodarka Materiałowa i Logistyka*, *6*.

Nowicka K. (2016a). *Cloud computing* – warunek *sine qua non sharing economy.* In M. Poniatowska-Jaksch, & R. Sobiecki (Eds.), *Sharing economy (gospodarka współdzielenia)* (pp. 69–88). Oficyna Wydawnicza SGH.

Nowicka, K. (2016b). *Outsourcing w zarządzaniu zasobami przedsiębiorstwa*. Difin.

Nowicka, K. (2017). Bimodal, multimodal or platform. What is a supply chain future strategy? *European Journal of Economics and Business Studies*, *3*(1), 52–62. https://doi.org/10.26417/ejes.v7i1.p52-62

Nowicka, K. (2019a). *Technologie cyfrowe jako determinanta transformacji łańcuchów dostaw.* Oficyna Wydawnicza SGH.

Nowicka, K. (Ed.). (2019b). *Biznes cyfrowy. Perspektywa innowacji cyfrowych*. Oficyna Wydawnicza SGH.

Ocicka, B., & Wieteska, G. (2017). Sharing economy in logistics and supply chain management. *LogForum, 13*(2), 183–193. http://dx.doi.org/10.17270/J.LOG.2017.2.6

Teece, D. J. (2010). Business models, business strategy and innovation. *Long Range Planning*, *43*(2), 172–194. https://doi.org/10.1016/j.lrp.2009.07.003

Wirtz, J., So, K. K. F., Mody, M. A., Liu, S. Q., & Chun, H. E. H. (2019). Platforms in the peer-to-peer sharing economy. *Journal of Service Management, 30*(4), 452–483. https://doi.org/10.1108/JOSM-11-2018-0369

Katarzyna Nowicka is a habilitated doctor of economic sciences, an adjunct at the SGH Warsaw School of Economics. She has been dealing with the issues of competitive supply chain management for over fourteen years. Her research interests concern the subject of the impact of digital technologies on supply chain management and shaping new business models.

Michael A. Kolitsky

Retrieval practice enhances online learning in academic courses

Abstract

Retrieval practice is described as a pedagogy that includes methods for giving students a chance to recall information during their study process. With the introduction of online learning and course management systems which permit secure testing online, a method is provided to generate many sets of small quizzes from large question pools which can serve as an efficient digital method for practicing recall of the information to be learned. Course management systems also provide a method to capture and store the results of the small quizzes used for retrieval practice. This study looks at data captured by taking numerous small quizzes as the retrieval learning process and compares the captured data sets to the grade distribution in the major exams for which the small quizzes are being used as a method to learn the material being tested. The overall results demonstrate that the use of retrieval practice does enhance student learning and was also found to lower the drop rate for the anatomy courses studied.

Keywords: retrieval practice, online courses, small quizzes, higher grades, drop rate

Introduction

Retrieval practice describes a method of learning that includes strategies designed so that students have a chance to recall information during their study process (Agarwal, 2019; Brunyé et al., 2020; Karpicke & Roediger, 2008). One familiar method to practice information recall is to study by using flash cards. But, the introduction of online learning and course management systems which permit testing online now provides a method to generate many sets of small exams from large question pools which can serve as an efficient digital method for practicing recall of the information in a way similar to the use of hand held flash cards. Course management systems also provide a method to capture and store the results of the small quizzes used for retrieval practice. Earlier studies (Kolitsky, 2008) using multiple test taking as a method to learn in exams taken in non-proctored conditions supported the view that exams taken in short time conditions gave similar grade distribution data when compared to exams that were given in a face-to-face classroom. The introduction in recent years of video proctoring technology such as Respondus Lockdown Browser (Respondus, n.d.) now provides a method to ascertain with greater certainty that cheating is not happening when testing is done online. This study looks at data captured from students taking numerous small quizzes for credit as the retrieval learning process and compares the captured small quiz data to the grade distribution in the major exams in several online courses offered in previous years when small practice quizzes were available but not for credit. The results show that offering students a small amount of credit for taking practice quizzes as a form of retrieval practice results in higher grade attainment when compared to the same courses offered in the fall semester for the past three years.

Retrieval practice data

Three courses were used as the focus for studying the impact of retrieval practice or multiple testing on learning. Histology has been offered online since 2000 and is currently offered three times a year in the fall, spring and summer semesters with enrollment now ranging from 180–200 students per semester. The Histology course has both a lecture as well as a lab component with lab images digitized from a collection of high-quality photos of both light and electron microscopic views of human tissues.

Michael A. Kolitsky, University of Texas at El Paso, USA, https://orcid.org/0000-0002-9796-154X

The online Anatomy and Physiology lecture and the online Anatomy and Physiology lab are taught as separate courses and for this study, only the fall 2019 semester will be studied with enrollments of 182 for the lecture and 131 in the lab. Each Anatomy and Physiology lecture and lab course utilize Anatomy.tv etext sold by Primal Pictures (Anatomy.tv, n.d.). The lab course also utilized the PhysioEx 9.1 lab manual (PhysioEx, 2020) with four online simulated experiments assigned for the fall semester. Other labs in the same course use, with permission, high quality human anatomy images from the Bassett Collection at the Stanford University Medical History Center (Bassett Collection, n.d.). Originally, they were designed to be used as 3D images when viewed with ViewMaster, but a similar experience could be achieved when using inexpensive red-blue glasses. Many of the right-left eye views used for ViewMaster can be made into anaglyph images for a more realistic experience (Kolitsky, 2013). Students in this lab have access to 3D red-blue glasses for viewing anatomical dissection in 3D. Other images for this lab came from the National Library of Medicine Visible Human project (National Library of Medicine, 1995) which has available images from the cross sectioning of frozen male and female cadavers so that transverse sections can be made into learning objects for the study of all body systems.

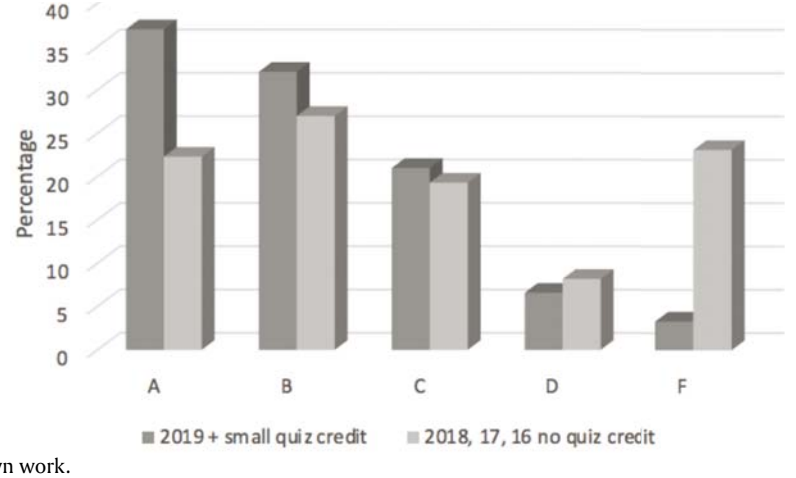
The basic plan for testing the effect of retrieval practice involves the use of small quizzes taken from a larger question pool and presenting the option to take these small quizzes numerous times. Incentive to do the quizzes was provided by giving a small amount of credit for doing the quizzes a number of times. How many times was dependent on an estimate made from an earlier study (Kolitsky, 2008) showing the number of quizzes students took who received high grades in online courses in which the number of quizzes done was determined. The number of quizzes done ranged from 20 to 40 for students in the A or B category with no credit assigned for doing the quizzes. For this study, it was decided to have 10 times be the point from which more quizzes would earn credit. So, there was a minimum of 10, and then the next five counted for credit, but the students usually did many more than 10 and then the last five tests taken counted for credit, and if high scores on quizzes 11–15 were not attained, then more would be done until the final five in a row earned a high credit score.

The credit for doing the quizzes varied in each course. In the Histology course, the smaller quizzes were each worth just 0.5 points out of the possible 100 that were generated for a grade for the course. The total points for the Histology lecture and lab small quizzes was 11 points out of the possible 100 for the entire course. For the Anatomy and Physiology lecture course, each small quiz was worth one point with 10 small quizzes counting for 10 points of the total 100 that can be earned. For the Anatomy and Physiology lab course, three small quizzes worth two points each for a total of six points were employed for the retrieval practice study. And because the small quizzes were providing some percentage of the overall points that determine the grade a student receives for a course, some of the exam data appearing in the following sections are listed as the actual points earned in the exam so those figures could then be compared to the number of small quizzes taken or the total points earned from doing the quizzes.

Histology course

Figure 1 shows the results of looking at the grade distribution of 182 students completing an online Histology course in the fall semester of 2019 compared with the grade distribution for students in the same online course offered in 2018, 2017 and 2016 with a total of 172 for fall 2018, 128 for fall 2017 and 137 students for the fall 2016 semester. Note that the data profile for the 2019 students in the dark gray columns visibly shifts to the higher grade category when compared to the light gray bars for the combined 2018, 2017 and 2016 grade distribution, with the highest percentage of students in the B grade category, and shows the positive effect of providing small quizzes for credit as an incentive for students to do them.

Figure 1. Histology grade distribution (2019 compared to 2018, 17, 16)



Source: author's own work.

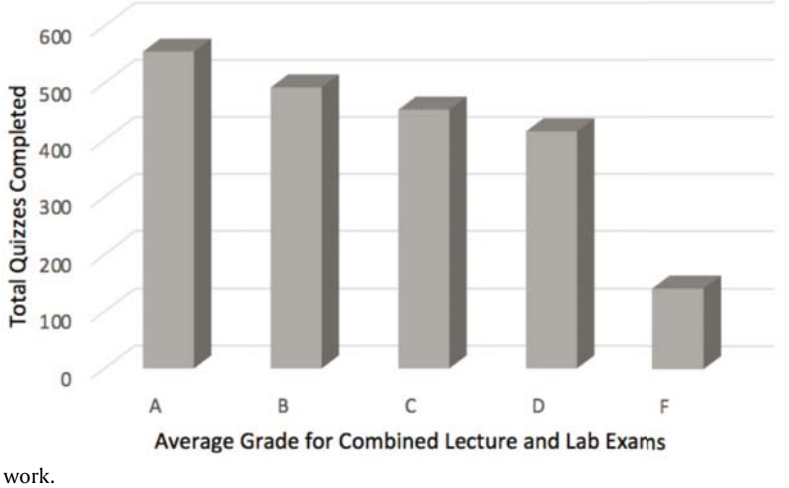
Figure 2 uses the Blackboard Evaluation option to generate course reports which focus on the Course Activity Overview that permits analysis of the total amount and type of activity for each student taking the exam. From this type of analysis, it is possible to gather data for how many times a small quiz or group of small quizzes was used in the study of a particular lab activity. For the data appearing in Figure 2, the number of times students completed a small quiz was captured and shows that students who received As in the course used the small quizzes the most with a decreasing number shown for B, less for C, even less for D and a large drop in small quiz usage in the F category.

Anatomy and Physiology lecture course

Figure 3 shows the grade distribution for an online Anatomy and Physiology I lecture course offered in the fall 2019 semester with 182 students enrolled and compared to a combined grade distribution for students in an Anatomy and Physiology I fall semester lecture course offered in 2018 with 153 students, 2017 with 115 students and in 2016 with 122 enrolled, for a combined number of 390 students for all three courses shown in Figure 3 as light gray bars. Note, as in Figure 1 for Histology, there is a similar shift to the higher grade categories as indicated by the dark gray bars for A and B when students were encouraged to do the small quizzes by attaching a small amount of credit to them compared to the combined data for 2018, 2017 and 2016 when small quizzes were also available but with no credit assigned for doing them.

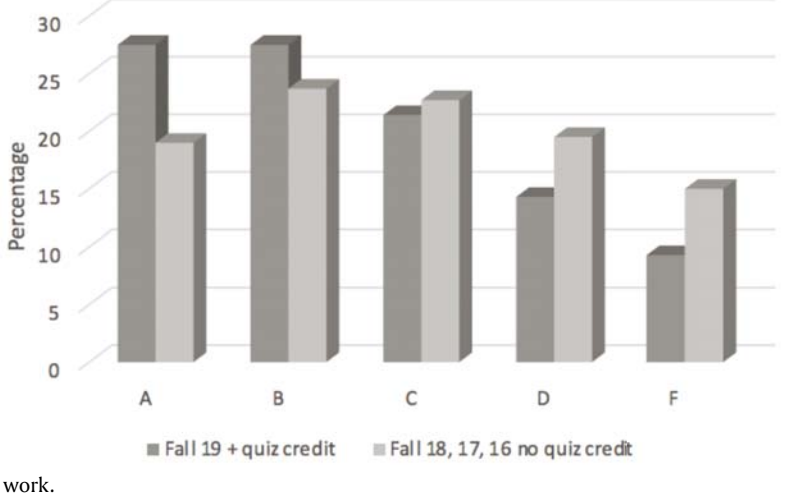
In Figure 4, the total points accumulated in the fall online Anatomy and Physiology lecture course for four exams (three lecture and one final exam) are shown in the darkest gray bars compared with the total points accumulated for doing the small quizzes (medium gray bar) and also for the total number of small quizzes done (lightest grey bar). In this graph, no points for other assignments such as submitting a brief bio (one point), doing a scavenger hunt (one point) and

Figure 2. Histology fall 2019 lecture & lab grades vs total quizzes completed



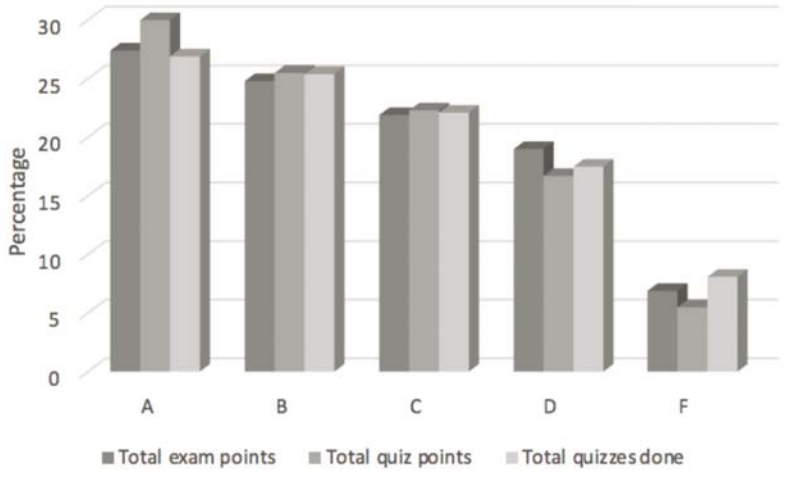
Source: author's own work.

Figure 3. AP I 2019 lecture grade percentage compared to 2018, 17, 16



Source: author's own work.

Figure 4. AP I 2019 lecture exam points vs quiz scores and quizzes done



Source: author's own work.

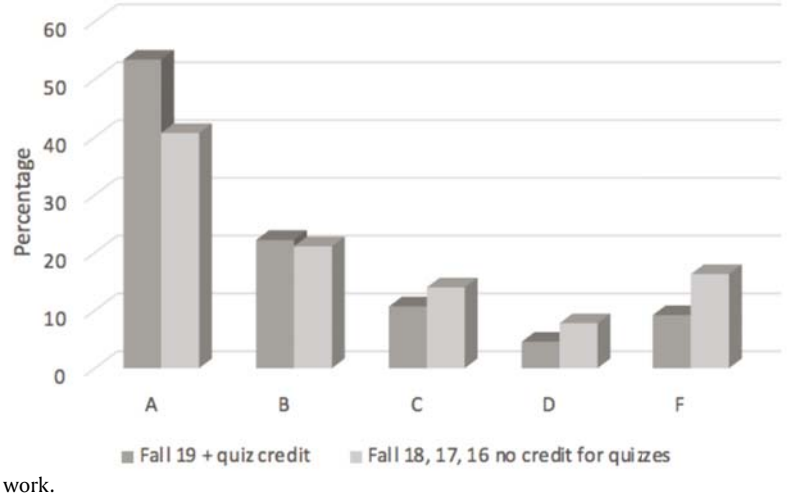
writing clinical studies (5 points) were included in the total exam points columns (darkest gray bars). The removal of points for other assignments leaves a more direct comparison of the number of points accumulated in the three lecture exams and one final exam with the total quiz points and number of small quizzes done. These numbers support the view that doing the small quizzes has a direct positive impact on student performance in the lecture exams which determine their grade. The total points earned from doing quizzes and the number of times a quiz was taken were obtained by using the Course Activity Overview tool in Blackboard which captures and displays every attempt a student makes and its result. Other course management systems also offer similar methods to capture and store usage data, providing a way to study the impact of retrieval practice on a broader scale.

Anatomy and Physiology lab course

Figure 5 shows the grade distribution for 131 students in the fall, 2019 offering of the online Anatomy and Physiology (AP) lab course compared to the grade distribution for a combined number of 131 students participating in the 2018 offering, 114 students in the 2017 and 115 students in the 2016 offerings of the same course. There is a small but noticeable shift of AP lab grades (dark gray bars) to the higher grade categories when compared to the combined grades (light gray bars) in the fall 2018, 2017 and 2016 semesters similar to what was observed in Figures 1 and 3 for the fall 2019 online offerings of the Histology, and Anatomy and Physiology lecture courses.

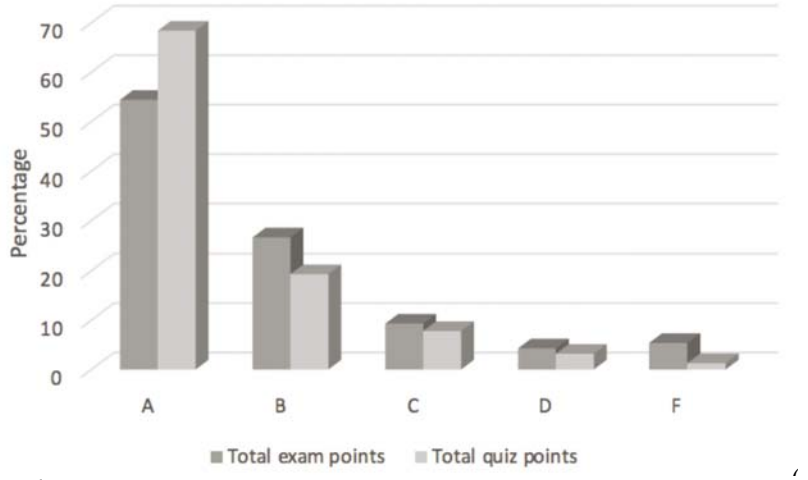
Figure 6 shows a strong correlation of the total points earned from doing the small quizzes (light grey bars) with the total exam points earned from taking the online Anatomy and Physiology lab exams (dark

Figure 5. AP I fall 2019 lab grade distribution vs fall 2018, 17, 16



Source: author's own work.

Figure 6. AP I Lab 2019 total exam points vs quiz points



Source: author's own work.

gray bars). The total points for the small quizzes were obtained by using the Course Activity Overview tool in Blackboard which, like many course management systems, provides a method to capture and display the total number of times that an activity such as taking a small quiz is recorded and also keeps a record of the points earned from taking the quizzes.

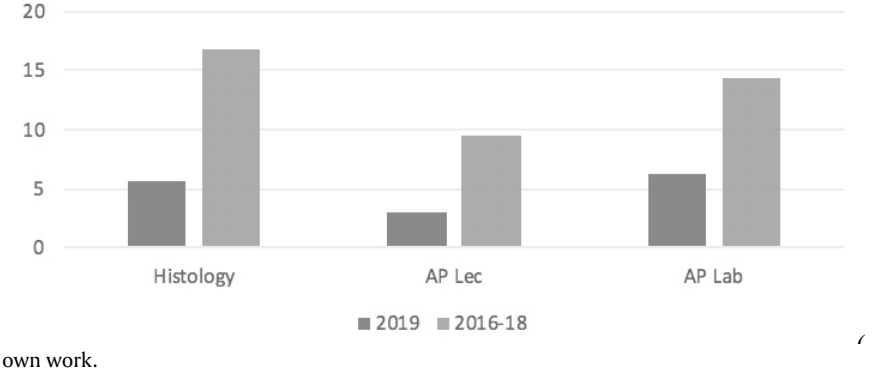
Impact of retrieval practice on the drop rate

Figure 7 shows an unexpected result from reviewing the percentage of students who dropped the online Histology, Anatomy and Physiology (AP) I Lecture and the Anatomy and Physiology (AP) I lab courses over the fall 2019 semester compared to the same online courses offered in the 2016, 2017 and 2018 fall semesters. The data in dark gray bars represent the courses in which the retrieval practice strategy of 'learning through testing' was encouraged through the offering of a small amount of credit for doing small quizzes. The light gray bars represent the percentage of students who dropped from the same courses offered in 2016, 2017 and 2018 with only encouragement given but no credit assigned for doing the small quizzes.

Number and types of questions in small quizzes

To implement a retrieval practice method of learning, two important parameters must be determined for optimal deployment. First, the number of questions in the larger question pool from which questions for each retrieval practice attempt are selected needs to be determined. And second, the types of questions which can reinforce the learning of terms (in this study, terms related to micro- and macro-anatomic structure, for example). Questions that require the learner to use the terms to explain the function of both normal and abnormal conditions must also be taken into consideration. The study of anatomy and physiology covers the language that must be understood so that the terms for the structures and their locations in the body can be used in sentence form to explain how they work in good health and also disease conditions. In this sense, the types of questions to include in the larger pool from which the small quizzes are made must be designed so that learning the answers to those questions can over time lead to the ability to recall the information in

Figure 7. Percentage drop 2019 with quiz credit compared with 2016–2018 no quiz credit



Source: author's own work.

the testing that counts for credit. Images with labels for identifying structural elements must also be part of the large question pool.

The small quiz pool for the lecture portion for the Histology course contained 523 items to learn when questions were chosen for retrieval practice whereas for the Histology lab portion, 850 answers were available in question format when questions were chosen for the small quizzes used for retrieval practice. For the Anatomy and Physiology I lecture course in this study, the small quiz pool contained 817 questions with answers available for retrieval practice and the Anatomy and Physiology I lab course included 243 questions with answers to be used for that activity.

Future use of retrieval practice

Online courses which utilize course management systems such as Blackboard offer the opportunity to gather meaningful data to test the impact of retrieval practice learning methods in courses such as those studied in this report. The courses in this study require learning the definitions of terms which are linked to how they explain normal and abnormal conditions. The learning method provided by the doing of small quizzes many times requires a large set of questions to draw from for each small quiz taken. How many times a student must do a small quiz, how many chapters should be covered in a set of small quizzes and how many small quizzes should be employed for optimal learning are still testable areas of study. However, the observations thus far show that pools of questions ranging from 50–100 seem to work well in providing enough coverage for learning the important information found in one or two text chapters. Courses from other areas of Biology and even other Science as well as non-science disciplines could have different portions of the material that needs to be learned in order to become literate in that field. Therefore, the extent to which using the retrieval practice methods may be beneficial for a particular discipline may vary.

The impact that retrieval practice has on student learning is linked to the capability of being able to analyze the periodic production of large amounts of data generated from taking small quizzes following completion of each major exam in the course being studied. In this study, the Environmental Science and Engineering Ph.D. program at The University of Texas at El Paso (UTEP) awarded Anand Raj, Ifeanyi Nwigboji and Kamal Nyaupane graduate teaching assistantships for the 2019–2020 academic year and they assisted in the calculation of the data gathered from the use of small quizzes in the online Histology, Anatomy and Physiology lecture and lab courses for the 2019 semester. From the data gathered in this study, retrieval practice does show an increase in student performance. Future use of retrieval practice may be more beneficial to students if data compilation was also employed to show students soon after completing an exam how their performance on doing the small quizzes used for study was important to their success on the major exam that was taken. This strategy, however, does require a quick turn-around of taking the major exam and feeding back to students the results from the calculations of the small quizzes done during study for the exam. It would also offer the opportunity to study the nature of how students learn, as student success in a particular discipline may be linked to their natural tendency to study based on a particular method that may or may not include a retrieval practice strategy. And lastly, there is also no reason that retrieval practice should only be used in online teaching. The use of small quizzes in the learning phase for a subject does not have to be only thought of as happening in an online class experience and could be employed as a learning tool in a traditional face-to-face teaching environment.

Effect of pandemic on retrieval practice study

The COVID-19 pandemic hit the El Paso area in the middle of the 2020 spring semester just prior to spring break. One of the responses of the administration was to postpone by one week the student return to campus following spring break to give the faculty extra time to transition all face-to-face classes into online courses. Students who were living on campus also had to go home or off campus and travel was also reduced for students who attended UTEP from Juarez, the city in Mexico just across the Rio Grande River from El Paso. Students in all courses were also given the opportunity to change their grading option from traditional letter grading of A–F to Satisfactory/Unsatisfactory. Many projects such as this one, which was continuing the effort started at the beginning of the 2019–2020 school year to demonstrate how best to utilize retrieval practice to improve online learning, were interrupted. What was learned, however, from the fall semester study was of benefit to students by providing them with a strong foundation for online learning through the continued use of retrieval practice methods for the spring and also now in summer online courses.

References

Agarwal, P. K. (2019). Retrieval practice & Bloom's taxonomy: Do students need fact knowledge before higher order learning? *Journal of Educational Psychology*, *111*(2), 189–209. https://doi.org/10.1037/edu0000282

Anatomy.tv. (n.d). Retrieved May 5, 2020 from https://www.anatomy.tv/welcomer

Bassett Collection of Stereoscopic Images of Human Anatomy. (n.d.). Retrieved March 5, 2020 from http://lane.stanford.edu/biomed-resources/bassett/index.html

Brunyé, T. T., Smith, A. M., Hendel, D., Gardony, A. L., Martis, S. B., & Taylor, H. A. (2020). Retrieval practice enhances near but not far transfer of spatial memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 46*(1), 24–45. https://doi.org/10.1037/xlm0000710

Karpicke, J. D., & Roediger III, H. L. (2008). The critical importance of retrieval for learning. *Science, 319*, 966–968. https://doi.org/10.1126/science.1152408

Kolitsky, M. A. (2008). Analysis of non-proctored anti-cheating and formative assessment strategies. *e-mentor, 4*(26), 84–88.

Kolitsky, M. A. (2013). *3D stereo images enhance online learning*. http://www.nextgenemedia.com/3Danatomy/index.html

National Library of Medicine. (1995). https://www.nlm.nih.gov/research/visible/visible_human.html

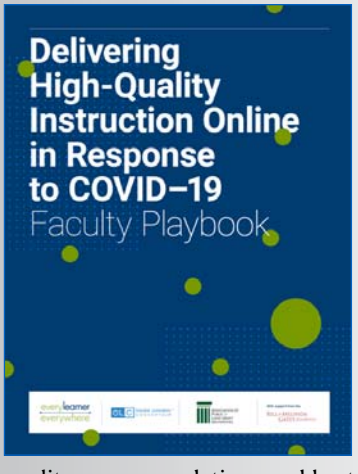
PhysioEx. (n.d.). Retrieved May 5, 2020 from https://www.physioex.com/order_info_pex9.html

Respondus Lockdown Browser. (n.d.). Retrieved May 5, 2020 from https://web.respondus.com/he/lockdownbrowser/

Michael A. Kolitsky received his Ph.D. from Temple University in Philadelphia, PA. and is now retired but teaching online for The University of Texas at El Paso (UTEP). Mike was a tenured professor of Biology at UTEP and was also appointed Associate Vice President for Instructional Technology overseeing the technology design and faculty training for a new Undergraduate Learning Center. He was the Principal Investigator for a 2.5 million dollar NASA grant to establish an instructional support and training center at UTEP for University and regional K-12 instructors. Mike also received a University of Texas Chancellor's Distinguished Teaching Award at UTEP and earlier was awarded a Distinguished Natural Sciences Curriculum Innovation award for his Embryology videodisc and HyperEmbryo courseware from EDUCOM. After leaving UTEP, he was appointed a founding board member for NJEDge.Net, the higher education network for New Jersey and served as Dean of Academic Computing and Distance Education at Atlantic Cape Community College prior to retirement. Mike was a consultant for the Rutgers University Library FIPSE grant to establish the New Jersey Digital Highway and also assisted in the production of several shared content objects (SCOs) with The University of Wisconsin-Madison Academic ADL Co-Lab FIPSE-sponsored effort to support effective online teaching. Mike is currently exploring how 3D laser cutting technology can be utilized in making audio-responsive tactile templates for learning cell biology and anatomy by students who are blind or visually impaired.

We recommend

Delivering High-Quality Instruction Online in Response to Covid-19. Faculty Playbook



As one can read in the Introduction "the playbook is a result of the collaboration between the Online Learning Consortium (OLC), the Association of Public and Land-grant Universities (APLU), and the Every Learner Everywhere Network with support from the Bill & Melinda Gates Foundation. It is designed to serve as a concise guide in addressing faculty needs for online course design, teaching, and continuous improvement."

Each topic covered in the playbook is organized along with three different levels: Design, Enhance and Optimize. As the authors point out, "these levels quickly guide you to the resources you need most, and each builds upon the previous, providing a path for continuous improvement along a continuum of increasing quality. The first level, Design, provides foundational information and resources for developing an online course and provides direction for moving courses online in emergent situations. The next level, Enhance, provides information to either continue quality course development or to improve the initial elements of a course moved online unexpectedly. Finally, the Optimize level offers resources for designing a course in alignment with the highest-quality recommendations and best practices, as well as for evaluation and maintenance."
Also included are resources and tips for online course development and delivery in both 'standard' and emergency-management circumstances. They can be freely mixed and matched according to the needs of a particular instructor or institution.

More information and the link to download the report at **https://www.everylearnereverywhere.org/resources/delivering-high-quality-instruction-online-in-response-to-covid-19/**

Hafiz Iqbal

E-mentoring: an effective platform for distance learning

Abstract

The provision of mentoring is essential for learning to take place, and current online technology is changing the nature of mentoring. This study examines the effectiveness of e-mentoring and develops its management practice. This study extensively uses historical reviews to seek a better policy for e-mentoring. It covers the literature on different forms of mentoring, including books, journals, online documents, research reports, and newspaper articles related to e-mentoring. Based on the findings from the literature, this study suggests that e-mentoring compares well to those of other mentoring approaches traditionally used. The study gives an overview of e-mentoring tactics, practices, and strategies. The findings of this will be useful for national and international policymakers and stakeholders, in promulgating effective e-mentoring policies.

Keywords: e-mentoring, knowledge management, online technology, scaffolding, effective learning

Introduction

Effective learning is essential for capacity building, knowledge management, and efficiency. Mentoring, coaching, consultation, counseling, in-depth conversation, and guidance are the major catalysts for effective learning. Generally, all the concepts are used interchangeably, but have different meanings and implications applied. For instance, counseling is a process where trained counselors diagnose and help clients with emotional problems (Batson & Marz, 1979). Coaching is a method of directing, instructing, and training a person or group of people to achieve some goals or develop specific skills (Kaur, 2019). Consultation is a process of discussing something with someone for the purposes of advice or opinion about specific services (Hennig-Thurau et al., 2004). In-depth conversation is offered by qualitative interviews to achieve perfect contextual ideas (Gaskell, 2000). Guidance is service-related work essential for the improvement of learners' learning attitudes, learning habits, and academic achievements (Abid, 2006). Mentoring is a power-free partnership between two individuals who desire to achieve mutual growth, where one of them usually has greater skills, experience, and wisdom (Weinstein, 1998). Firstly, it provides an instrument or career function (e.g. sponsorship or corporate and cultural instruction) and secondly an intrinsic or psychological function (e.g. serving as a model, a confidant, and a friend) (Cunningham, 1999).

Mentoring is a significant approach to a better learning atmosphere. It updates the learners' skills, attitudes, and approaches to learning. Weaker learners obtain more benefits from rigorous mentoring where learning assistance is offered to the mentees by the mentor (Raabe & Beehr, 2003; Tyler, 1998). The concept and significance of mentoring were first highlighted in Homer's Odyssey (Gumus, 2019). The teacher of Odysseus's son was treated as an early mentor. He guided, protected, and educated the inexperienced Telemachus (son of Odysseus and Penelope) (Conyers, 2004). With this historical basis and information, a mentor is counted as a wise and patient counselor (Gumus, 2019). Mentoring provides ways and means of learning, where the mentor's role is supportive (Smith, 2007).

Mentoring can be a rewarding experience for the mentee. A mentor can be a tremendous source of advice and information, a sounding board for the mentee's ideas, and can aid the mentee in academic excellence, career development, and professional growth (RWSA Secretariat, 2020). The relationship is essential for establishing effective

Hafiz Iqbal, Government Edward College, Bangladesh, https://orcid.org/0000-0001-6181-1980

mentoring. Initiation, time frame, formality, intensity, reciprocity, and agenda are all essential elements of mentoring. Under the mentoring process, both parties (mentor and mentee) know their roles and responsibilities. A mentor always supports and encourages mentees, where respect is critical to the success of the mentoring relationship. Constructive feedback from the mentor is an important part of the mentoring relationship. The principal objective of mentoring covers the activities that will support the mentee's academic and professional goals (e.g. practicing skills or tasks, attempting new projects or assignments, continuous learning). Likewise, mentors may also develop leadership skills through the constructive feedback of their mentees and share knowledge. From that viewpoint, mentorship is purely about providing professional guidance and learning from each other.

Mentoring takes two forms: traditional mentoring and online technology-supported mentoring. Traditional mentoring (t-mentoring) is about design, guidance, and support by the institution. Face-to-face mentoring practice at a certain place and time is a typical example of formal mentoring. On the other hand, online technology-supported mentoring has no specific forms or design. Mutual desire and respect, interest, and the understanding between the mentor and mentee can enhance online technology-supported mentoring. It can take place at anytime and anywhere. A popular form of this mentoring is e-mentoring (Risser, 2013), which is a strategy where the mentor can meet the mentee (usually online) to discuss goals, expectations, and interests. The general objectives of e-mentoring include (1) update mentees knowledge through online technology; (2) identify strategies or activities to support the mentee's learning goals (e.g. continuous learning, practicing skills or tasks; and trying new projects or assignments); (3) share information and expertise; and (4) identify the hidden potential for improvement.

E-mentoring has gained momentum in learning and professional development (York-Barr & Duke, 2004). It is essential for purposeful learning over time with the principal goal of helping mentees to acquire essential competencies (Pfund et al., 2016). Professional goals, expectations of the mentor and the mentee, career development, constructive feedback, enthusiasm for the learning opportunity, motivational spirit, learning techniques, and career plans can all achieve an appropriate shape when the mentee is instructed and guided by a mentor. It helps to connect the mentor and mentee in a network and enable them to learn from each other.

This study gives an overview of e-mentoring and its potential benefits. The major areas of contributions of this study are to (1) highlight the influence of e-mentoring as a supplement to t-mentoring in filling gaps in learning and development; (2) enrich related literature; (3) provide further support for career-building, skill-acquisition, and coaching; (4) provide action steps to promote an e-mentoring program in learning; and (5) attempt to provide a specific guideline for mentoring, not only for school, college, and university education worldwide but also for other sectors which plan to start a mentoring program for effective learning. This study examines the effectiveness of e-mentoring and develops a management strategy. This study has been organized as follows: Section 1 describes the background and motivational aspects under the introduction. Section 2 covers a discussion of the literature in the field of mentoring. Section 3 outlines the methodology. Section 4 delineates the best practices of e-mentoring in learning. Finally, Section 4 gives the concluding remarks and recommendations.

Literature review

This notion of traditional mentoring is obsolete in modern times due to its conservative view of learning, linear transformation of knowledge, and asymmetrical power relations between participants (Angelique et al., 2002; Tynjälä & Heikkinen, 2011). The socio-constructivist theory of learning explains that there are different kinds of mentoring, such as peer collaboration, co-mentoring, e-mentoring, mutual mentoring, collaborative mentoring, critical constructivist mentoring, dialogical mentoring, and reciprocal mentoring (Pennanen et al., 2016). Peer mentoring, mentoring circles, and peer-group mentoring, apprenticeship, and tutoring are also treated as other forms of mentoring (Fyn, 2013). An effective mentoring program should consist of training, success, motivation, advice, direction, support, and coaching. Learning issues should be the subject matter in every mentoring program and should be designed by ontological specificity (Pennanen et al., 2016).

Mentoring is a process where a senior experienced person (mentor) guides another person (mentee) in the development of ideas, learning, concepts, and professional competence (Achinstein & Fogo, 2015; Klinge, 2015). E-mentoring is another form of mentoring, one which is gaining worldwide popularity (McCarthy, 2012). This mentoring practice is associated with a supportive relationship between the mentor and mentee, with a relative advantage for computer self-efficacy and personal interest where age or seniority does not gain weight (Panopoulos & Sarri, 2013). According to Laura Bierema and Sharan Merriam (2002), mentoring is not necessarily based on a wise elder dispensing advice and instruction to a mentee. The mentor may find it difficult to engage in online e-mentoring because it is impersonal. There is a possibility of conflict arising between two generations or age groups when it comes to e-mentoring (Rowland, 2012). It may happen between peers, one-on-one, one mentor as part of a team, or mentors providing mentor support to other mentors. It depends upon the form of guidance and the level of cognitive, social, and emotional developments and attributes (Carpintero, 2015), and generates mutual benefits for them (Akili, 2013; Leão & Ferreira, 2013; Vesilind, 2001).

In recent times, e-mentoring has been associated with career, academic, and psycho-social development, and mitigates the difficulties of the traditional mentoring approach (Bierema & Merriam, 2002). E-mentoring or Tele-mentoring or computer-mediated communication (CMC) is a popular mentoring approach in the information age (Haran & Jeyaraj, 2019). The mentor and mentee can easily communicate with each other to and from anywhere. Bierema and Merriam (2002) argue that e-mentoring has greater potentiality in effective mentoring. It has greater advantages over the traditional mentoring approach. It includes the egalitarian quality of the exchange and has no boundary in the configuration. Raymond Noe (1988) asserts that work-related interpersonal skill is accurately guided by the psychosocial factors of e-mentoring. The success of e-mentoring is dependent on the performance of the mentor, internet and bandwidth facilities, geographical and time constraints, and technology proficiencies. Few studies argue that geographical and time constraints are not responsible for hampering e-mentoring practice. Ritu Arora and Sanjay Goel (2018) argue that the provision of e-mentoring makes the mentoring process easy and convenient, since it is not bound by spatial and temporal differences. Peg Single and Carol Muller (2005) point out that geographical and scheduling constraints are not barriers for effective mentoring because they link the mentors with the mentees independently. The unique qualities of electronic communications can enhance the mentoring relationship, although Kevin Hunt and Glen Atherfold (2004) argue that the mismatch of time between two different geographical locations, improper communication practice, and lack of trust may hamper e-mentoring practice. Likewise, improper facility and mismanagement of online technology may also hamper e-mentoring practice (Schechter, 2014).

E-mentoring is both a career and opportunity tool. Participation in a webinar and summer research school, access to the job market, and online training courses offered by different research institutions or universities are highly associated with e-mentoring practice (Badri et al., 2017). It is a suitable approach to transferring valuable knowledge and skills efficiently to the mentee, and under this approach the protégés gain direction and a motivational link to overcome leadership role barriers, to develop leadership qualities and self-efficiency (Fernandez et al., 2017; Joo et al., 2018). This mentoring practice provides benefits and confidence-building, not only for mentees but also for mentors (Hudson, 2013). Andrea Nolan and Tebeje Molla (2017) argue that confidence-building is a principal component of professionalism for mentor and mentee, human capital (knowledge and skill), social capital (provision collaborative learning), and decision capital (ability to exercise opinion). But it also has a shadow side, which sometimes creates a barrier to reaching the target goal. Lisa Ehrich and Brian Hansford (1999) point out that e-mentoring is considered 'the pain of fractured trust', 'the pain of letting go' and 'the pain of disappointment' when it functions inappropriately. A lack of punctuality or organizational commitment and breaks in commitment and mismanagement by experienced and qualified mentors may hamper the effectiveness of mentoring so that it loses its merit and gravity (Clawson & Kram, 1984; Hale, 2019).

Technological advancement can reshape mentoring from the traditional approach to the e-mentoring approach for demand-based human resource development. Chandana Sanyal and Chris Rigby (2017) report that e-mentoring can work as a bridge between regional, national, and global mentoring relationships (GMR). The proper use of online technology and English language skill can improve e-mentoring practice worldwide. E-mentoring can promote the empowerment of women. It can successfully remove the so-called glass-ceiling effect and stereotypical profile of women in economic, political, and professional life. Collaborative participation and proper utilization of e-mentoring can eliminate gender inequality and enhance more scope in the use of online or digital technologies (Parmaxi et al., 2017).

E-mentoring is commonly practiced in many educational institutions in upper-, middle- and high-income countries. The impact of e-mentoring in learning has been effectively tested empirically in New Zealand, Portugal, the Netherlands, and the USA (Avalos, 2011). These countries successfully utilize e-mentoring for continued professional development (CPD) in the education, research, hospitality, and service sectors (Ekeroma et al., 2015). For instance, the University of Canterbury (UC), New Zealand has successfully implemented e-mentoring practice for better distance learning (Dabner, 2011). This practice is not properly utilized in the education and other sectors of many lower-income and lower-middle countries due to resource constraints and the acceptance level of e-mentoring (Van Dyk & Meghzifene, 2017).

Based on a case study, Nicki Dabner (2011) investigates how e-mentoring is functioning in a blended online environment. The study by Mehmet Kahraman and Abdullah Kuzu (2016) also depends on a case study and suggests that the e-mentoring approach is essential for every pre-service teacher. Daniel Homitz and Zane Berge (2008) use cost-benefit analyses to show that e-mentoring plays an important role in improving the mentoring or coaching capacity. By a systematic search of an electronic database, Alec Ekeroma et al. (2015) develop strategies to implement e-mentoring in the education sector. Kimberly Rowland (2012) depends on meta-analysis to show the relationship between mentoring, learning, and teaching as mediated by digital techniques. Lew Perren (2003) also depends on a meta-review of academic literature to examine the role of e-mentoring in entrepreneurial education and design policy-based research for e-mentoring.

The status of the current literature on e-mentoring shows many issues, the nature, and the concepts related to distance learning. The study strives to draw a more precise conclusion from e-mentoring and learning. This study may be the first attempt to

assess the significance of mentoring in learning in the South Asian Countries.

Methodology

A systematic search of electronic databases was performed for relevant articles for the period 1979 to 2020. An attempt was made to provide a comprehensive review of e-mentoring by evaluating its current status and identifying the implementation problems of e-mentoring. All studies related to e-mentoring were selected at random in order to develop its concepts, strategies, and drivers. The most relevant and peer-reviewed literature were read, downloaded, and collated from reputable bibliographic databases, such as PubMed, Google Scholar, Emerald, ScienceDirect, and the repository of the World Bank for suitable evaluation of e-mentoring policy. The reviewed literature was limited to editorials, meta-analysis, reviews, case studies, master's thesis, blogs, comments, comparative studies, evaluation studies, English abstracts, synthesis reports, government reports, journal articles, validation studies, proceedings, newspapers, and edited books. The research protocols combined the effectiveness of e-mentoring, compared the practice of e-mentoring, and contrasted and compared e-mentoring with traditional mentoring.

Best practices for e-mentoring

E-mentoring entails connecting regularly via phone, Skype/WhatsApp/Viber/Messenger, and maintaining communication by e-mail and message (Ladyshewsky & Pettapiece, 2015). In this form, the mentor and mentee can be encouraged to meet online, at the request of the mentee, for guidance through the development of concepts and ideas. The mentee is responsible for setting up the online meetings, making their expectations clear, and documenting the outcomes (Schlager & Fusco, 2003).

Mentoring is a popular learning platform in developed countries (Salleh & Tan, 2013). The educational institutions in these countries can easily implement a mentoring program for their students because it is the best platform for learning where a learner can enhance their reading, writing, networking, presentation, oral communication, time planning, project management, and problem-solving skills. With the advancement and improvisation of information communication technology (ICT), educational institutions in the modern world now prefer e-mentoring for their students because of its numerous advantages. These are more numerous compared to the traditional face-to-face mentoring approach. Table 1 outlines the comparison of e-mentoring and face-to-face mentoring.

It is clear from Table 1 that e-mentoring has a greater positive magnitude for effective learning. The higher values of the correlation coefficients (*r*) in e-mentoring suggest that there is a strong relationship between distance learning and e-mentoring, compared to those of traditional mentoring. E-mentoring has had significant effects on distance learning. Based on the numerous benefits of e-mentoring, a mentor can provide guidelines like advice, direction, feedback, support, motivation, and counseling through the online technology. Without online technology, it is very difficult to run e-mentoring smoothly. The following activities are samples and practical ways of improving essential skills through mentoring. A mentor can provide suggestions that can be tailored to meet the specific needs and goals of the mentee or replace other activities as the mentor and mentee see fit. Table 2 illustrates hypothetical mentoring activities with the best-fit online technology.

E-mentoring performs well in weekly blog posts, case reports, and interviews with mentees. However, the performance of this e-mentoring program is influenced by several critical strategies, such as exploring technology affordances and limitations, scaffolding, sharing feedback, communication channels, and connecting online technology (Baran, 2016). For instance, it is a better option to share knowledge and disseminate information about a conference, short courses, seminars, training programs, the publication of professional journals, and the provision of study grant opportunities by Facebook (Ritchie & Genoni,

Table 1. Comparison of e-mentoring and face-to-face mentoring

Scope	Unit	E-mentoring	Traditional mentoring	Evidence-based literature
Spatial benefits of mentoring	Likert scale	Perfectly (r=0.82)	Partially (r=0.13)	Hamilton & Scandura, 2003
Temporal benefits of mentoring	Likert scale	Perfectly (r=0.88)	Partially (r=0.09)	Scandura & Pellegrini, 2007
Asynchronous benefits	Likert scale	Perfectly (r=0.81)	Partially (r=0.17)	Rowland, 2012; Pietsch, 2012
Reduced discrimination by race and gender	Likert scale	Perfectly (r=0.92)	Partially (r=0.21)	Scandura & Pellegrini, 2007
Proper use of online technology	Likert scale	Perfectly (r=0.87)	Partially (r= 0.07)	Hamilton & Scandura, 2003
Reduced cross-gender effect	Likert scale	Perfectly (r=0.82)	Partially (r= 0.22)	Hamilton & Scandura, 2003
Rich diversified cultural practice	Likert scale	Perfectly (r=0.80)	Partially (r= 0.13)	Hansman, 2017
Developed communication skill	Likert scale	Perfectly (r=0.83)	Partially (r=0.37)	Tanis & Barker, 2017

Source: adapted from Ahmed, 2019.

Table 2. Online e-mentoring instruments for professional development in teaching

Skills	Activities for mentors and mentees	Effective online instruments
Reading/Writing	Mentor can help to develop mentee's class notes and offer essential training for academic excellence.	E-mail, Skype, Dropbox, and Google Drive
Thematic expertise	Mentor or mentee can share articles and reading documents relevant to their sector.	E-mail, YouTube, Dropbox, Google Drive, WhatsApp, and Viber
Oral communication	Mentor can encourage the mentee to participate in activities that will enhance oral communication.	Skype, Messenger, Viber, and WhatsApp
Networking	Mentor can provide essential tips for improving networking activities.	Facebook, Viber, and WhatsApp
Brainstorming	Mentor advises on higher studies.	Skype, Messenger, Viber, and WhatsApp
Time planning / Project management	Make agenda for one of their meetings where they can review and provide feedback	Dropbox or Google Drive
Problem-solving	Mentor can ask the mentee to talk about a problem they are facing in their studies. Talk about possible solutions and the strengths and weaknesses of each.	Skype or WhatsApp or Viber
Continuous learning	Talk about how the mentee learns best. Encourage the mentee to take advantage of learning opportunities the mentor may be familiar with (online courses, workshops, conferences, webinars, internships, etc.)	Skype or WhatsApp or Viber

Source: Adapted from RWSA Secretariat, 2020.

1999). Dropbox is the best alternative delivery and document sharing option for mentoring in terms of academic development (Evans & Forbes, 2012; Mollenkopf, 2009). A mentor can observe the mentee's performance by uploading a video on messenger and WhatsApp and provide feedback and reflection through Skype (Gregory & Salmon, 2013; Owen, 2015; Reese, 2016). A mentor or mentee can share large volumes of popular books, learning videos, and movies for a better understanding of an event or its consequence by Google Drive or Dropbox (Hicks & McCracken, 2010; Tareef, 2013).

Conclusion and recommendations

Mentoring is a very popular platform for learning and works as a shade tree for the novice mentee. A mentee can improve their academic excellence under the guidance of a knowledge bearing mentor. Mentoring is about a concern for the growth of learning and knowledge. The relationship between mentoring and learning is straightforward. Psychosocial factors, such as feedback, direction, advice, motivation, support, counseling, empathy, friendship, socialization, acceptance, and confirmation are all influential factors of the mentoring process that helps in proper learning.

This study attempts to partially synthesize the concept of e-mentoring to improve learning in the distance mode. A critical review of the concepts of mentoring, effectiveness of mentoring in learning, and the state of affairs about mentoring are investigated and deeply explored in the existing literature. The literature review of the study highlighted that mentoring holds promise as an induction practice for learners in all sectors. The impact of e-mentoring has been tested in Italy, New Zealand, Portugal, the Netherlands, and the USA. The existing literature suggests that e-mentoring practice is commonly utilized in many middle and high-income counties for continued professional development (CPD). It is important to bear in mind that quality learning always requires effective mentoring practice, with regular participation by the mentor and mentee in the mentoring program through demonstration, trial mode, brainstorming, presentation, learning by doing, and similar activities. E-mentoring is one of the best approaches compared to traditional face-to-face approaches. E-mentoring is commonly practiced in many educational institutions in upper and middle-income as well as high-income countries. Mentoring practice ensures quality learning via online technology and has the potential to address many needs of students from different locations because it offers a flexible tool where the mentor and mentee can be connected, depending on geographical and time constraints. Better management of e-mentoring requires cost-effective equipment and training for the proper handling of online technology (Fransson, 2016). The facility for equipment use and an adequate knowledge of ICT is essential for e-mentoring. It requires response and communication skills from both the mentor and mentee. Mentees from different geographical locations can gain easy access to e-mentoring and interact with a mentor for essential advice, direction, support, and counseling.

Although e-mentoring offers multiple benefits, it is not for everyone, as the degree and magnitude of e-mentoring vary due to generational gaps. In general,

a junior mentee tends not to prefer a senior mentor. In this particular case, there is a possibility of conflict arising between mentor and mentee from two separate generations. Trust and communication are fundamental elements within a virtual environment and must be obtained in an e-mentoring setting (Rowland, 2012). Without setting a virtual bond and enhancing the interpersonal connections, achieving an e-mentoring program can be difficult. Jill Nemiro (2004) argues that time zones, cultural backgrounds, insufficient internet and bandwidth, and technology proficiencies may hamper learning through e-mentoring.

Based on the existing literature related to mentoring in learning, this study recommends the following to achieve proper e-mentoring in learning: 1) school, college and university administrations should arrange training program for mentors; 2) school, college and university authorities should arrange basic computer training program for mentors and mentees; 3) educational institutions should give priority to their e-mentoring program; 4) educational institutions should provide financial support to buy electronic equipment for all the mentors and mentees; 5) educational institutions should give incentives to mentors for their mentoring activities; and 6) e-mentoring should be compulsory practice in every educational and research institution.

The study is not free from certain lacunas. As a new concept, it is essential to undertake more discussions and in-depth studies related to e-mentoring. To achieve a better assessment, it is essential to conduct further research in the field, including surveys involving questionnaires and interviews. Only literature-based assessments on e-mentoring can narrow down the scope and concept of mentoring practice. Hence, this study recommends further studies to avoid such shortcomings and to formulate a better mentoring-related policy for improved professional development.

Acknowledgments

The work presented in this paper was a part of the assignment of Leading Learning in the School of Education, University of Nottingham, Malaysia Campus (UNMC). I greatly acknowledge Assistant Professor Henry M. Koge for his many useful comments and suggestions. I am thankful to the editor and other anonymous referees of this journal paper for their valuable and constructive suggestions for improving the draft.

References

Abid, H., Ch. (2006). Effect of guidance services on study attitudes, study habits and academic achievement of secondary school students. *Bulletin of Education and Research, 28*(1), 35–45.

Achinstein, B., & Fogo, B. (2015). Mentoring novices' teaching of historical reasoning: opportunities for pedagogical content knowledge development through mentor-facilitated practice. *Teaching and Teacher Education*, *45*, 45–58. https://doi.org/10.1016/j.tate.2014.09.002

Ahmed, M. T. (2019). *Impact of e-mentoring on learning* (Unpublished master's thesis). Government Edward College.

Akili, W. (2013). *On mentoring relationships: how to become a good mentor. IEEE Frontiers in Education Conference (FIE)*, Oklahoma City, OK, pp. 710–716. https://doi.org/10.1109/FIE.2013.6684919

Angelique, H., Kyle, K., & Taylor, E. (2002). Mentors and muses: new strategies for academic success. *Innovative Higher Education, 26*(3), 195–209. https://doi.org/10.1023/A:1017968906264

Arora, R., & Goel, S. (2018). *Supporting e-mentoring for programming labs in engineering education. Eleventh International Conference on Contemporary Computing (IC3)*, Noida, pp. 1–6. https://doi.org/10.1109/IC3.2018.8530476

Avalos, B. (2011). Teacher professional development in *Teaching and Teacher Education* over ten years. *Teaching and Teacher Education*, *27*(1), 10–20. https://doi.org/10.1016/j.tate.2010.08.007

Badri, M., Alnuaimi, A., Yang, G., Al Rashidi, A., & Al Sumaiti, R. (2017). A structural equation model of determinants of the perceived impact of teachers' professional development—The Abu Dhabi application. *SAGE Open*, *7*(2), 1–18. https://doi.org/10.1177/2158244017702198

Baran, E. (2016). Investigating faculty technology mentoring as a university-wide professional development model. *Journal of Computing in Higher Education*, *28*(1), 45–71. https://doi.org/10.1007/s12528-015-9104-7

Batson, C. D., & Marz, B. (1979). Dispositional bias in trained therapists' diagnoses: does it exist? *Journal of Applied Social Psychology, 9*(5), 476–489. https://doi.org/10.1111/j.1559-1816.1979.tb02720.x

Bierema, L. L., & Merriam, S. B. (2002). E-mentoring: Using computer mediated communication to enhance the mentoring process. *Innovative Higher Education*, *26*(3), 211–227. https://doi.org/10.1023/A:1017921023103

Carpintero, S. (2015). Qualities that mentors in the university setting should have. *Procedia – Social and Behavioral Sciences*, *197*, 255–258. https://doi.org/10.1016/j.sbspro.2015.07.132

Clawson, J. G., & Kram, K. E. (1984) Managing cross-gender mentoring. *Business Horizons*, *27*(3), 22–32. https://doi.org/10.1016/0007-6813(84)90021-1

Conyers, J. (2004). Thinking outside to support newcomers. *School Administrator*, *61*(6), 18–21.

Cunningham, S. (1999). The nature of workplace mentoring relationships among faculty members in Christian higher education. *The Journal of Higher Education*, *70*(4), 441–463. https://doi.org/10.2307/2649310

Dabner, N. (2011). Design to support distance teacher education communities: A case study of a student-student e-mentoring initiative. In M. Koehler, & P. Mishra (Eds.), *Proceedings of SITE 2011-Society for Information Technology & Teacher Education International Conference* (pp. 218–223). Nashville, Tennessee, USA: Association for the Advancement of Computing in Education (AACE). https://www.learntechlib.org/primary/p/36262/

Ehrich, L. C., & Hansford, B. (1999). Mentoring: pros and cons for HRM. *Asia Pacific Journal of Human Resources*, *37*(3), 92–107. https://doi.org/10.1177/103841119903700307

Ekeroma, A. J., Kenealy, T., Shulruf, B., & Hill, A. (2015). Educational and wider interventions that increase research activity and capacity of clinicians in low to middle income countries: A systematic review and narrative synthesis. *Journal of Research and Development, 3*(1), 1–9. https://doi.org/10.4172/jrd.1000120

Evans, R. R., & Forbes, L. (2012). Mentoring the 'net generation': faculty perspectives in health education. *College Student Journal*, *46*(2), 397–405.

Fernandez, R., Sheppard-Law, S., Curtis, S., Bancroft, J., & Smith, W. (2017). Exploring the experiences of neophyte nurse mentors: A qualitative study. *Nurse Education in Practice, 29*, 76–81. https://doi.org/10.1016/j.nepr.2017.11.011

Fransson, G. (2016). Online (web-based) education for mentors of newly qualified teachers: Challenges and opportunities. *International Journal of Mentoring and Coaching in Education*, *5*(2), 111–126. https://doi.org/10.1108/IJMCE-12-2015-0039

Fyn, A. F. (2013). Peer group mentoring relationships and the role of narrative. *The Journal of Academic Librarianship, 39*(4), 330–334. https://doi.org/10.1016/j.acalib.2012.11.016

Gaskell, G. (2000). Individual and group interviewing. In M. W. Bauer, & G. Gaskell (Eds.), *Quantitative researching with text, image and sound: A practical handbook* (pp. 38–56). Sage.

Gregory, J., & Salmon, G. (2013). Professional development for online university teaching. *Distance Education*, *34*(3), 256–270. https://doi.org/10.1080/01587919.2013.835771

Gumus, E. (2019). Investigation of mentorship process and programs for professional development of school principals in the USA: The case of Georgia. *International Journal of Educational Leadership and Management*, *7*(1), 2–41. https://doi.org/10.17583/ijelm.2019.3718

Hale, A. K. (2019). *The relationship between mentors' motivation levels, job satisfaction levels, and intention to stay in current organization* (Unpublished doctoral dissertation). Northcentral University.

Hamilton, B. A., & Scandura, T. A. (2003). E-mentoring: Implications for organizational learning and development in a wired world. *Organizational Dynamics*, *31*(4), 388–402. https://doi.org/10.1016/S0090-2616(02)00128-6

Hansman, C. A. (2017). Adult learning theories in mentoring relationships and models. *Theory and Practice of Adult and Higher Education*, 215–241.

Haran, V. V., & Jeyaraj, A. (2019). Organizational e-mentoring and learning: An exploratory study. *Information Resources Management Journal (IRMJ)*, *32*(1), 58–72. https://doi.org/10.4018/IRMJ.2019010104

Hennig-Thurau, T., Gwinner, K. P., Walsh, G., & Gremler, D. D. (2004). Electronic word-of-mouth via consumer-opinion platforms: What motivates consumers to articulate themselves on the internet? *Journal of Interactive Marketing, 18*(1), 38–52. https://doi.org/10.1002/dir.10073

Hicks, R., & McCracken, J. (2010). Three hats of a leader: Coaching, mentoring and teaching. *Physician Executive*, *36*(6), 68–70.

Homitz, D. J., & Berge, Z. L. (2008). Using e-mentoring to sustain distance training and education. *The Learning Organization*, *15*(4), 326–335. https://doi.org/10.1108/09696470810879574

Hudson, P. (2013). Mentoring as professional development: 'Growth for both' mentor and mentee. *Professional Development in Education*, *39*(5), 771–783. https://doi.org/10.1080/19415257.2012.749415

Hunt, K. R., & Atherfold, G. (2004). *E-mentoring: is it good for entrepreneurial learning?* Paper presented at the International Council for Small Business Conference. Johannesburg, South Africa. Retrieved from https://bit.ly/2VaDojH

Joo, M.-K., Yu, G.-C., & Atwater, L. (2018). Formal leadership mentoring and motivation to lead in South Korea. *Journal of Vocational Behavior*, *107*, 310–326. https://doi.org/10.1016/j.jvb.2018.05.010

Kahraman, M., & Kuzu, A. (2016). E-mentoring for professional development of pre-service teachers: A case study. *Turkish Online Journal of Distance Education*, *17*(3), 76–89. https://doi.org/10.17718/tojde.19973

Kaur, N. (2019). Emerging trends in sports coaching. *International Journal of Physiology, Nutrition and Physical Education, 4*(1), 1784–1786.

Klinge, C. M. (2015). A conceptual framework for mentoring in a learning organization. *Adult Learning*, *26*(4), 160–166. https://doi.org/10.1177/1045159515594154

Ladyshewsky, R., & Pettapiece, R. (2015). Exploring adult learners usage of information communication technology during a virtual peer coaching experience. *The Official Journal of the Online Learning*, *19*(2), 1–15. https://doi.org/10.24059/olj.v19i2.520

Leão, C. P., & Ferreira, A. C. (2013). Shedding light on important mentorship relationships issues in advanced engineering education. *1st International Conference of the Portuguese Society for Engineering Education (CISPEE),* Porto, 2013, pp. 1–6. https://doi.org/10.1109/CISPEE.2013.6701974

McCarthy, J. (2012). International design collaboration and mentoring for tertiary students through Facebook. *Australasian Journal of Educational Technology*, *28*(5). https://doi.org/10.14742/ajet.1383

Mollenkopf, D. L. (2009). Creating highly qualified teachers: Maximizing university resources to provide professional development in rural areas. *The Rural Educator*, *30*(3), 34–39.

Nemiro, E. J. (2004). *Creativity in virtual teams. Key components for success.* John Wiley & Sons.

Noe, R. A. (1988). An investigation of the determinants of successful assigned mentoring relationships. *Personnel Psychology*, *41*(3), 457–479. https://doi.org/10.1111/j.1744-6570.1988.tb00638.x

Nolan, A., & Molla, T. (2017). Teacher confidence and professional capital. *Teaching and Teacher Education*, *62*, 10–18. https://doi.org/10.1016/j.tate.2016.11.004

Owen, H. D. (2015). Making the most of mobility: virtual mentoring and education practitioner professional development. *Research in Learning Technology*, *23*, 1–14. https://doi.org/10.3402/rlt.v23.25566

Panopoulos, A. P., & Sarri, K. (2013). E-mentoring: The adoption process and innovation challenge. *International Journal of Information Management*, *33*(1), 217–226. https://doi.org/10.1016/j.ijinfomgt.2012.10.003

Parmaxi, A., Vasiliou, C., Ioannou, A., & Kouta, C. (2017). Empowerment of women through an innovative e-mentoring community platform: implications and lessons learned. *Journal of Community Informatics*, *13*(3), 36–53. http://ci-journal.net/index.php/ciej/article/view/1318

Pennanen, M., Bristol, L., Wilkinson, J., & Heikkinen, H. L. T. (2016). What is 'good' mentoring? Understanding mentoring practices of teacher induction through case studies of Finland and Australia. *Pedagogy, Culture & Society*, *24*(1), 27–53. https://doi.org/10.1080/14681366.2015.1083045

Perren, L. (2003). The role of e-mentoring in entrepreneurial education and support: a meta-review of academic literature. *Education + Training*, *45*(8/9), 517–525. https://doi.org/10.1108/00400910310508900

Pfund, C., Byars-Winston, A., Branchaw, J., Hurtado, S., & Eagan, K. (2016). Defining attributes and metrics of effective research mentoring relationships. *AIDS and Behavior, 20*, 238–248. https://doi.org/10.1007/s10461-016-1384-z

Pietsch, T. M. (2012). A transition to e-mentoring: Factors that influence nurse engagement. *CIN: Computers, Informatics, Nursing*, *30*(12), 632–639. https://doi.org/10.1097/NXN.0b013e318266cbc5

Raabe, B., & Beehr, T. A. (2003). Formal mentoring versus supervisor and coworker relationships: Differences in perceptions and impact. *Journal of Organizational Behavior*, *24*(3), 271–293. https://doi.org/10.1002/job.193

Reese, J. (2016). Virtual mentoring of preservice teachers: Mentors' perceptions. *Journal of Music Teacher Education*, *25*(3), 39–52. https://doi.org/10.1177/1057083715577793

Risser, H. S. (2013). Virtual induction: A novice teacher's use of Twitter to form an informal mentoring network. *Teaching and Teacher Education*, *35*, 25–33. https://doi.org/10.1016/j.tate.2013.05.001

Ritchie, A., & Genoni, P. (1999). Mentoring in professional associations: continuing professional development for librarians. *Health Libraries Review*, *16*(4), 216–225. https://doi.org/10.1046/j.1365-2532.1999.00241.x

Rowland, K. N. (2012). E-mentoring: An innovative twist to traditional mentoring. *Journal of Technology Management & Innovation*, *7*(1), 228–237. http://dx.doi.org/10.4067/S0718-27242012000100015

RWSA Secretariat. (2020, February 4). *The RWSN mentoring programme* [Electronic mailing list message].

Salleh, H., & Tan, C. (2013). Novice teachers learning from others: Mentoring in Shanghai schools. *Australian Journal of Teacher Education*, *38*(3). http://dx.doi.org/10.14221/ajte.2013v38n3.1

Sanyal, C., & Rigby, C. (2017). E-mentoring as a HRD intervention: an exploratory action research study within an International Professional Mentoring Scheme. *Human Resource Development International*, *20*(1), 18–36. https://doi.org/10.1080/13678868.2016.1220156

Scandura, T. A., & Pellegrini, E. K. (2008). Workplace mentoring: Theoretical approaches and methodological issues. In T. D. Allen & L. T. Eby (Eds.), *The Blackwell handbook of mentoring: A multiple perspectives approach* (pp. 71–91). https://doi.org/10.1111/b.9781405133739.2007.00005.x

Schechter, C. (2014). Mentoring prospective principals: Determinants of productive mentor–mentee relationship. *International Journal of Educational Reform*, *23*(1), 52–65. https://doi.org/10.1177/105678791402300103

Schlager, M. S., & Fusco, J. (2003). Teacher professional development, technology, and communities of practice: Are we putting the cart before the horse? *The Information Society*, *19*(3), 203–220. https://doi.org/10.1080/01972240309464

Single, P. B., & Muller, C. B. (2005). Electronic mentoring programs: a model to guide practice and research. *Mentoring and Tutoring*, *13*(2), 305–320.

Smith, A. A. (2007). Mentoring for experienced school principals: professional learning in a safe place. *Mentoring and Tutoring*: *Partnership in Learning 15*(3), 277–291. https://doi.org/10.1080/13611260701202032

Tanis, H., & Barker, I. (2017). E-mentoring at a distance: An approach to support professional development in workplaces. *Turkish Online Journal of Distance Education*, *18*(3), 135–155. https://doi.org/10.17718/tojde.328944

Tareef, A. B. (2013). The relationship between mentoring and career development of higher education faculty members. *College Student Journal*, *47*(4), 703–711.

Tyler, K. (1998). Mentoring programs link employees and experienced execs. *Human Resource Magazine, 43*(5), 98–103.

Tynjälä, P., & Heikkinen, H. L. T. (2011). Beginning teachers' transition from pre-service education to working life: theoretical perspectives and best practices. *Zeitschrift für Erziehungswissenschaft*, *14*, 11–33. https://doi.org/10.1007/s11618-011-0175-6

Van Dyk, J., & Meghzifene, A. (2017). Radiation oncology quality and safety considerations in low-resource settings: A medical physics perspective. *Seminars in Radiation Oncology*, *27*(2), 124–135. https://doi.org/10.1016/j.semradonc.2016.11.004

Vesilind, P. A. (2001). Mentoring engineering students: turning pebbles into diamonds. *Journal of Engineering Education, 90*(3), 407–411. https://doi.org/10.1002/j.2168-9830.2001.tb00620.x

York-Barr, J., & Duke, K. (2004). What do we know about teacher leadership? Findings from two decades of scholarship. *Review of Educational Research*, *74*(3), 255–316. https://doi.org/10.3102/00346543074003255

Weinstein, E. (1988). *Mentoring for success*. America Media.

Hafiz Iqbal currently works as an Assistant Professor (Economics) in the Government Edward College, Pabna-6600, Bangladesh. He is a global environmental leader recognized by the Japanese Ministry of Education, Culture, Sports, Science, and Technology. His interest and expertise include Peace and Human Security, Poverty and Livelihood of the coastal zone, Hedonic Psychology, Settlement, and Land Use Policy, Behavioral and Experimental Economics, Environmental and Resource Economics, Ecological Economics, Econometrics, and Rural-Urban migration. He authored many scientific and academic journals published in different countries. He won a presentation award for excellent performance from Nagoya University Global Environmental Leaders (NUGELP).

We recommend

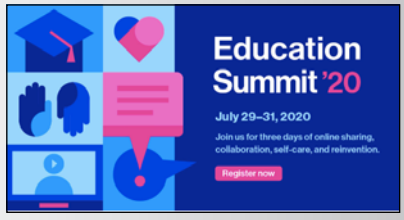
It is time for summit

The statement that COVID pandemic has changed the world we live in sounds like a cliché, but the truth is that it impacted many aspects of our lives, and luckily not all the changes are for bad. In that uncertain time, a plethora of various resources and events aiming to support teachers is available for free. Many conferences which normally would have been unaffordable either because of the distance or their costs are being delivered now online and very often without any charge. While during the first wave the help was offered for the immediate transition to online learning, this summer is the proper time for reconsidering and improving the often spontaneous solutions as to make them more sustainable and better adjusted both to the needs of teachers and their students.

The offerings differ in time and form so that everyone can choose what suits them most. Here are some examples – more can be found in Calendar on the e-mentor website at **http://www.e-mentor.edu.pl**

LearningRevolutionis the conference which started in June 2020, and is happening throughout July, and maybe the next months as well. It depends on the interest – both of the presenters and attendees because everyone can volunteer to become a presenter.
The organizers promote the initiative in a following way: This is an historic and unique event. Sessions are being held daily all free to attend live. To see the schedule, to attend virtually and/or to present one has to join the LearningRevolution movement, but the membership is free.
A set of time-zone-based calendars list all sessions as they are scheduled on a rolling basis. The sessions will also be recorded and available to watch for free during the conference.
The call for proposals is continually open. Presentation acceptances will be made on a rolling basis almost immediately, and presenters will be given the opportunity to choose a presentation day/time that is convenient to their own schedule.
More information at: **https://learningrevolution.com**

Course Hero Virtual Education Summit '20, July 29–31, 2020



On this event website its organizers declare: 2020 has been a challenging year, so this Education Summit has been reimagined to help us meet the moment.
We are moving online and providing complimentary access to general session programming across all three days of the event, so everyone can come together to Regroup, Reset, and Reinvent in preparation for the remote/hybrid teaching demands ahead. We are convening university leaders, instructors, learners, epidemiologists, virologists, social scientists, political activists, and more, to unpack the uncertainty and possibility of our new normal – and explore actionable ways forward.
The event will include three days of research sharing, presidential panel conversations, campus reopening discussion forums, online teaching demonstrations, learning science workshops, participatory breakout sessions for focused conversations, social events for network building, family programming (to keep the young learners entertained), yoga and wellness hours, musical interludes by emerging student artists, and even a DJ for some virtual movemaking.
This is more than just an event. It is a community in action.
More information about the summit at **https://events.coursehero.com/education-summit/home?utm_source=olc&utm_medium=sponsored&utm_campaign=summit2020&utm_term=edu**

ALT Summer Summit 2020, Learning Technology in a time of crisis, care and complexity

The Associations' of Learning Technology Online Summer Summit 2020 will bring together Learning Technology practitioners, researchers and policy makers from across sectors to share strategies for the next academic year and the new challenges now facing us.
With a packed programme over 2 days we will explore the themes of crisis, care and complexity. The Summit has an international line up of featured speakers, practical sessions and panel discussions on topics ranging from assessment to student wellbeing.
The programme for the summit will be made up of sessions with a practical focus on support, sharing expertise and networking. This event is not entirely free of charge, but its fee is affordable, and it differs depending whether the participant is an ALT member or not.
More information at **https://altc.alt.ac.uk/summit2020/**

WWW.E-MENTOR.EDU.PL

e-mentor

INFORMATION FOR THE AUTHORS

Publishers: Warsaw School of Economics (SGH) & Foundation for the Promotion and Accreditation of Economic Education

Editorial Office: Al. Niepodleglosci 162/ 150, 02-554 Warsaw, Poland, tel./fax: +48 22 646 61 42
E-mail address: redakcja@e-mentor.edu.pl

ABOUT THE JOURNAL

E-mentor is an academic journal published both in printed (in 1200 copies distributed for free) and in the open access electronic form. Throughout the last 14 years, it became a well-established peer reviewed academic journal, officially listed by the Polish Ministry of Science and Higher Education as one of the highest ranked (15 points) scientific journals. It is distributed to the numerous university libraries and other educational institutions, as well as to individual subscribers from academia and business. Due to the growing interest and number of submissions from other countries e-mentor is now becoming an international journal with certain editions published fully in English. Creating high quality, peer-reviewed content that is used by researchers, students and practitioners around the world remains our commitment and ambition.

SUBJECT AREAS

Originally established as the journal on e-learning, e-business and knowledge management e-mentor now covers a much broader scope of topics. Issues related to the presence of ICT in education are no longer limited to e-learning at the academia. Any form of TEL, formal or informal, along with its lifelong dimension fits with the present scope of the journal. Teaching methods and programs could also be taken into consideration as well as the challenges that digital technology brings to the lives of individuals and the whole communities or businesses.

ACCEPTED PAPERS

The journal welcomes original works based on the authors own scientific investigations. The papers may represent a variety of theoretical perspectives and different methodological approaches. They may rest on the full spectrum of established methodologies, from laboratory experiments to field observations. The main criteria in review and selection process concern the significance of the contribution to the area of tertiary education as well as business and knowledge management with special emphasis on the role of ICT in those areas.

ADDITIONAL TIPS

Before submitting the file please make sure that:

- The abstract and relevant keywords are included
- All references mentioned in the Reference List are cited in the text, and vice versa
- All illustrations and graphs list their source, even if they are created by the author
- Permission has been obtained for use of copyrighted material from other sources (including the internet)
- Biographical notes and photographs of every author are added
- Manuscript has been 'spell checked' and 'grammar checked'

Detailed tips are published on the website:

http://www.e-mentor.edu.pl/eng/page/8/Info_for_Authors

SZKOŁA GŁÓWNA HANDLOWA W WARSZAWIE

Fundacja Promocji i Akredytacji Kierunków Ekonomicznych

SGH
Warsaw School of Economics

SGH shapes leaders

We offer full-time studies in English

First-cycle programmes:

- Global Business, Finance and Governance
- International Economics
- Management
- Quantitative Methods in Economics and Information Systems

Second-cycle programmes:

- Advanced Analytics – Big Data
- Finance and Accounting with ACCA Qualification
- Global Business, Finance and Governance
- International Business

www.sgh.waw.pl/admission

CEMS PIM EFMD EUA AMBA ACCREDITED IQA eucen ECSA EDAMBA

FT European Business Schools Ranking 2019