


Blended Learning: The New Normal for Post-COVID-19 Pedagogy

Naglaa Megahed, Port Said University, Egypt*

 <https://orcid.org/0000-0001-5388-5066>

Ehab Ghoneim, Port Said University, Egypt

ABSTRACT

As we approach a new normal in post-COVID-19 pedagogy, we need to consider blended learning (BL) as a significant contribution to precautionary and preventive actions for containing the spread of COVID-19. This paper provides a framework to recognize transformation to a new normal by 1) reviewing the history of BL associated with its models and design options; 2) presenting general characteristics of BL in a matrix of place, distance, and technology; and 3) analyzing scenario planning and strategies for reopening academic institutions. Based on the BL continuum and health and safety conditions resulting from the pandemic, the study first proposed a scenario planning framework. Second, it developed a classification framework of BL addressing its continuum, models, and learning theories via a smart learning environment. Finally, the study proposed a conceptual matrix of BL that considers health and safety conditions resulting from the COVID-19 pandemic.

KEYWORDS

Blended Learning, COVID-19, Delivery, Online Education, Pedagogy

INTRODUCTION

What does *post-pandemic* mean, and to what does the prefix *post* refer? *Post* means *after*, of course, but not often does it indicate linear progression. Usually, *post* manifests as a long, messy transformation. A second definition pertinent to this study comes from Alexander (2013), who states that for many people, *pedagogy* means just teaching, without any bigger picture. Put another way, pedagogy is what instructors do in classrooms but not why they do it, that is, the action itself divested of its justifications, values, theories, evidence, and especially of the relationship with the wider world that makes teaching an educative rather than merely a technical process (Csibra & Gergely, 2006; Gergely et al., 2007). In this context, the study seeks to enhance pedagogy, not teaching, and to discover the most suitable learning model for post-pandemic pedagogy.

From its emergence, the Covid-19 pandemic grew quickly into a truly global phenomenon (Evans et al., 2020; Megahed and Ghoneim, 2020; Murphy, 2020), for the last year sending academic

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*Corresponding Author

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institutions worldwide the message “Move education online as quickly as possible,” thus forcing a rapid transition to online and remote education (Alshammari et al., 2020; Wargo, 2020).

And, indeed, the pandemic’s spread has led to profound changes across the globe, and the education sector has been far from immune. University life as we have known it has ceased to exist, while physical contact between people has been generally banned in order to contain Covid-19’s spread. Among the many precautionary actions taken, one was closing public and private universities’ physical classes and transferring instructional activities to virtual platforms. Many academic institutions have opted to cancel all face-to-face (F2F) education, including laboratories and other learning experiences, and mandated that faculty members move their courses online; at this writing, the list of institutions making this decision continues to grow (Almetwazi et al., 2020; Hodges et al., 2020; Siripongdee et al., 2020).

No doubt humanity worldwide is living in a precarious time. As in education, daily life behaviors are changing, driven partly by online technology, into what is called the “new normal.” Traditional ways must necessarily become new norms, and thus, the language of the new normal has also begun to emerge.

In education, e-learning strategies have so far been the immediate response to Covid-19’s demands, while in the long term, the blended learning (BL) environment will likely be the most appropriate response for balancing all stakeholders’ interests. Combining face-to-face lectures with technology gives rise to BL and flipped classrooms—learning environments that can increase students’ learning potential. Students can learn anytime, anywhere—in the process, developing new skills for lifelong learning. Previous research refers to BL as the new traditional model, or the new normal, in course delivery, indicating that BL approaches might be fruitful (Asarta & Schmidt, 2020; Eom, 2021; Graham, 2013; Krishnamurthy, 2020; Norberg et al., 2011; Shih & Kuo, 2021). Indeed, BL forces us to consider digital technology’s characteristics in general, and information communication technologies (ICTs) models more specifically (Dhawan, 2020; Dziuban et al., 2018; MacCallum et al., 2017; Parsons, 2014). With these givens, this study’s goal is to discover BL’s post-pandemic directions. Thus, the study addresses several questions. What are the general characteristics of BL in terms of time, place, space, and technology? Where on the BL continuum do instructors want to place their instructional model, and what model(s) will they follow to implement it? What are the BL planning scenarios and strategies for reopening physical schools? What issues and challenges arise in blending?

The study’s starting point is BL classification through its brief history, associated with its definitions, models, and design options. This is followed by analysis of BL’s general characteristics according to a matrix of place, distance, and technology. Next, planning scenarios and strategies for reopening schools are discussed. Finally, based on the BL continuum and health and safety conditions resulting from the Covid-19 pandemic, some thoughts about post-pandemic pedagogy are offered.

BL CLASSIFICATION

BL has become a promising approach for creating new learning environments that improve learning effectiveness and enrich learning experience. Especially during the pandemic, such an environment might support wide-ranging instructional activities in various disciplines. Researchers in educational technology, specifically in the subdiscipline of online and distance learning, have carefully defined many terms to distinguish among highly variable design solutions developed and implemented in BL.

BL: History, Definitions, and Directions

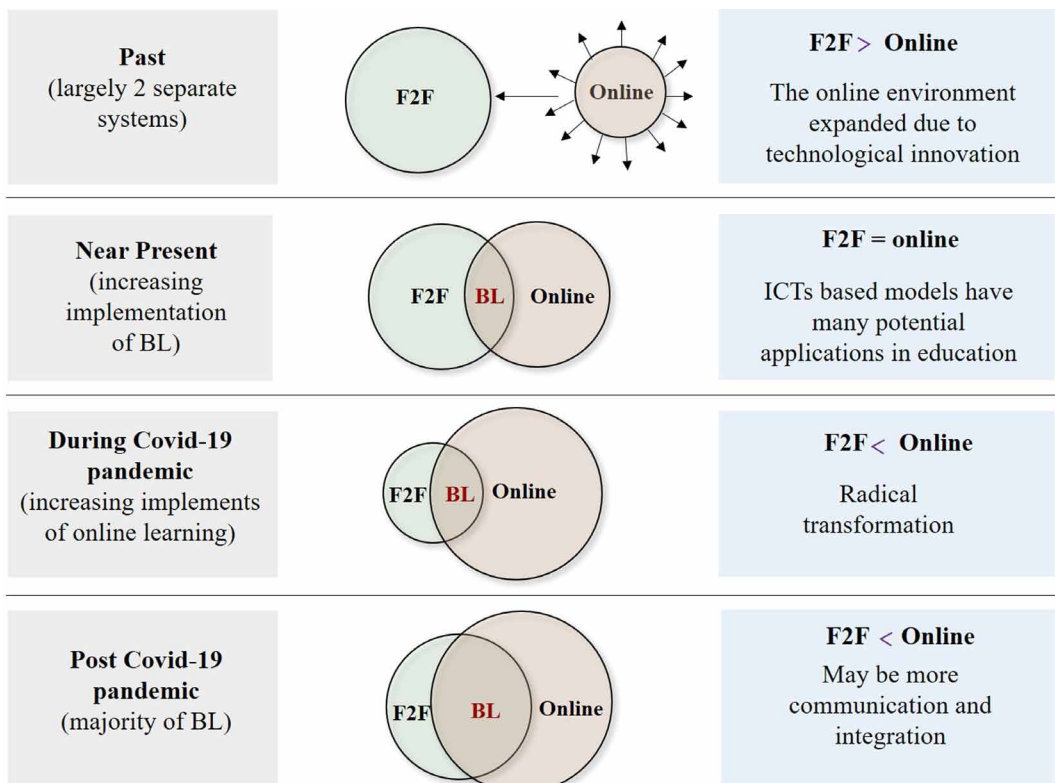
As synchronized and asynchronized distance learning, online education is not new, but in academia, it has been considered supplementary to traditional education because of the concerns and challenges surrounding it. To address the pandemic’s recent educational challenges, however, online education has become a ubiquitous approach. In the educational technology field, BL is a concept that can

incorporate many technologies into the traditional classroom (Evans et al., 2020; Ibrahim et al., 2020; Graham, 2006; Norberg et al., 2011; Siripongdee et al., 2020).

No doubt the digital revolution continues to change the world radically, and computer applications have made digital technology an essential part of our lives. Although during the last few years, ICT-based models' progress has been incredible, continued rapid developments in technology offer many potential applications, and distance education is readily available. The online educational environment has expanded exponentially as new technologies have added more and more possibilities for further communication and integration (Abo El-Einen et al., 2015; Graham, 2006; Megahed, 2015). As shown in Figure 1, BL's evolution has followed two lines, that is, *traditional face-to-face* and *online* have remained largely separate due to employment of different media and methods. Recently, however, BL has become a promising approach for creating new learning environments that improve learning effectiveness and enrich learning experience. Such a "smart" learning environment can likely support a wide range of teaching and learning activities in different subject matter at different levels. In these BL environments, students can learn anywhere, anytime, and interact with instructors and other students.

Many terms and concepts are related in various degrees to BL's definition, including hybrid, smart classroom, augmented learning, mobile learning, online learning, e-learning, distance learning, and Learning Management System (LMS), among others. All have in common using a computer connected to a network, offering instruction anywhere, anytime, through many and varied means (Cojocariu et al., 2014; Ibrahim et al., 2020; McBrien et al., 2009; Sangrà et al., 2012; Singh & Thurman, 2019). Based on the background and terms above, BL can be defined as follows:

Figure 1. The evolution of blended learning (Source: Adapted from Graham (2006))



- **Variation:** A mix of pedagogical approaches, philosophies, strategies, and tools with or without technology.
- **Integration:** Resulting from varied models including different learning styles, delivery modes, and teaching methods.
- **Interaction:** Resulting from the combination of face-to-face and interaction with technology or, more specifically, online learning and computer-mediated applications.
- **Flexibility:** Resulting from fluid design options that meet all the required needs and, at least in part, through online learning, with some control over time, place, path, and/or pace.
- **Transformation:** Resulting from shifts in curriculum design, instructor and student roles, and instructional methods.

BL design options go beyond the traditional classroom to enhance the best student engagement and achievement. They could be a) formal and/or informal; b) technology and/or people-based; c) independent and/or dependent, and d) directive and/or discovery-oriented. As the term suggests, “blended” learning belongs to no specific theory but can combine any learning theories, approaches, or pedagogies, including constructivism, behaviorism, and the cognitivist approach. Thus, BL lies not at either end of the instructional spectrum, but rather mixes strategies from all along the continuum into one integrated approach to learning (Bates & Bates, 2005; Christensen et al., 2013; Horn & Staker, 2014; Jones et al., 2009; Megahed, 2018; Rossett et al., 2003).

The BL Matrix and Models

Many educators employ BL to combine new digital modalities into traditional or face-to-face instruction or, thoughtfully and systematically, to integrate the best of face-to-face interaction with the best of online technology. In addition to end-of-spectrum, face-to-face and fully remote online models, most BL approaches resemble one of four models: rotation, flex, self-blend, and enriched virtual. The rotation model includes four sub-models: station rotation, lab rotation, flipped classroom, and individual rotation (Altamimi & Ramadan, 2016; Cockrum, 2017; Norberg et al., 2017; Siripongdee et al., 2020; Tambunan et al., 2021). Based on the literature (Asarta & Schmidt, 2020; Horn & Staker, 2014; Valiathan, 2002), the following summarizes BL models:

- **Face-to-face:** The educator drives instruction and augments with digital tools.
- **Rotation:** Students rotate through a schedule of independent online study and face-to-face learning. This includes: a) the station rotation model that students experience within a contained classroom or group of classrooms; b) the lab rotation model, in which the entire curriculum is delivered via a digital platform but in a consistent physical location; students usually take traditional classes in this model as well; c) the flipped classroom model, in which students participate in online learning off-site instead of traditional assignments and then attend campus for face-to-face, instructor-guided practice or projects; and d) the individual rotation model, in which each student has an individualized playlist and does not necessarily rotate to each available station or modality. An algorithm sets individual student schedules.
- **Self-blend model:** Students choose to augment their traditional learning with online coursework. This model can include circumstances in which students choose to take one or more courses entirely online to supplement their traditional courses. Thus, students “self-blend,” choosing some individual online courses and other courses at a campus with in-person instructors.
- **Flex model:** This model lets students move among learning activities in fluid schedules according to their needs. Most of the curriculum is delivered via a digital platform, but instructors are available for face-to-face consultation and support.
- **Enriched virtual model:** Students have required face-to-face learning sessions with their instructor of record and then are free to complete their remaining coursework remotely. Online

learning is the backbone of student learning when they are located remotely. The same person generally serves as both the online and face-to-face instructor.

- **Remote online model:** All curriculum and teaching are delivered via a digital platform, but face-to-face meetings are scheduled or made available if necessary.

The most popular forms of BL are the rotation and flex models. However, during the Covid-19 pandemic, other models have been gaining traction. Under the umbrella of the many and varied BL definitions, almost any teaching practice can be viewed as BL. A matrix of learning models (Figure 2) illustrates what constitutes BL and what does not, with the aid of different ICT-based models.

SCENARIO PLANNING AND STRATEGIES FOR REOPENING

As a public health phenomenon, the Covid-19 pandemic is unprecedented, perhaps the worst in more than a century. All of humanity is involved in controlling this sudden, unforeseen infection (Eltarabily & Elghezanwy, 2020; Khalili, 2020), and during the pandemic, knowledge delivery has become a challenging task. Its hazards disrupt educational processes in several ways. It has led to closure of universities creating serious consequences for students, depriving them of their fundamental right to education and exposing them to future risks (Di Pietro, 2017; Dhawan, 2020). The social distancing currently predominant is expected to continue for at least the next few academic years for fear of the virus's continuance (Kanneganti et al., 2020). Certainly, this situation will negatively affect learning opportunities, so the following recommends a scenario planning framework and presents emergency planning considerations for reopening educational institutions based on BL strategies.

Scenario Planning Framework for BL

In recent years, scenario planning has enjoyed wide acceptance among academics as a decision support aid to strategy formulation (Franco et al., 2013). As per the researchers' assessment, returning to normal educational processes anytime soon is at least uncertain. Therefore, this study proposes a four-phase scenario planning framework to guide instructors and educational designers in choosing or creating appropriate BL: a) preparation; b) design; c) implementation; and d) analysis and evaluation. As Figure 3 illustrates, the framework offers step-by-step analysis for addressing various reopening scenarios, considering Covid-19 health and safety requirements.

Figure 2. A matrix of learning models (Source: Adapted from Bhaskar (2013))

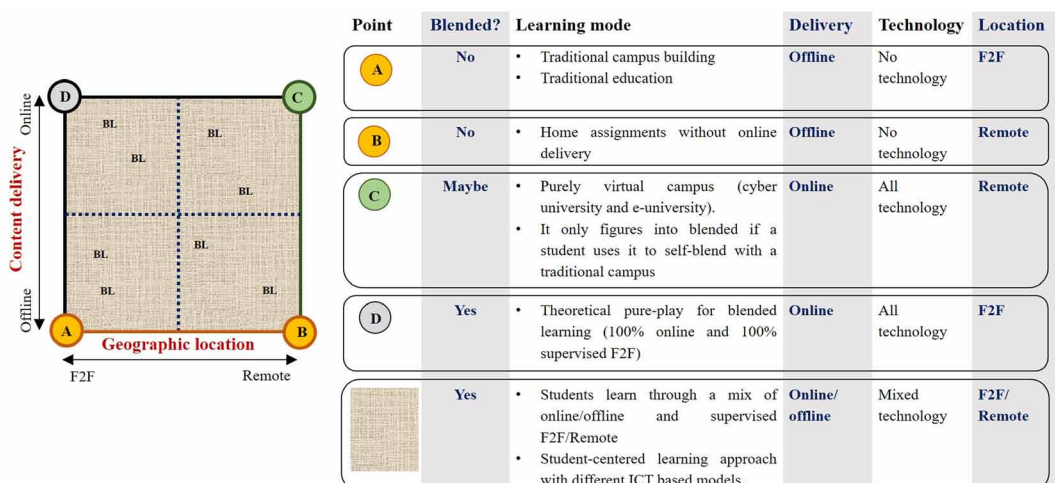
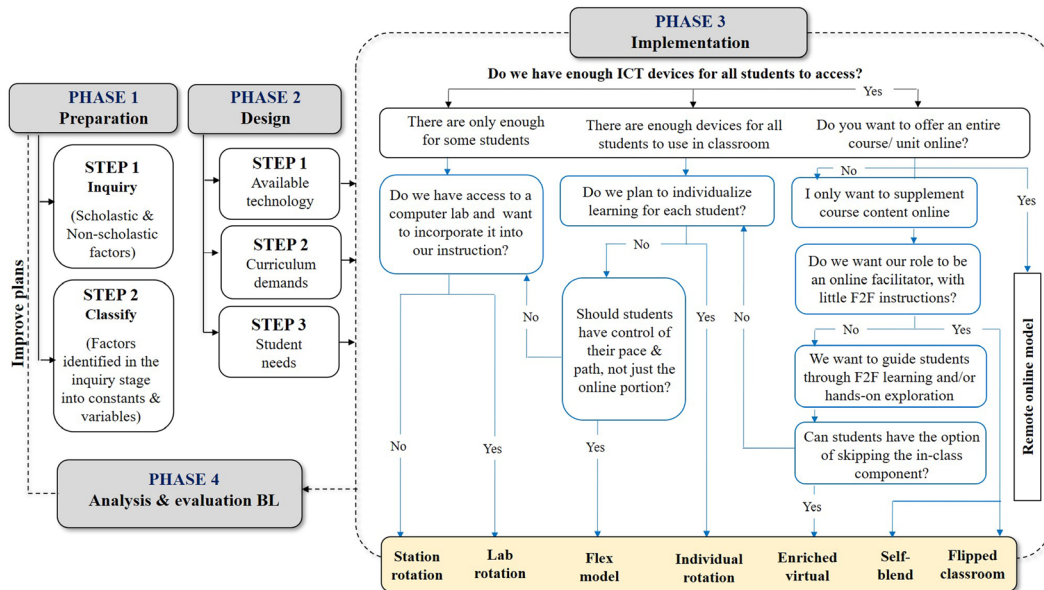


Figure 3. Blended learning scenario planning framework and models



Preparation

The Covid-19 pandemic has taught us that everything is unpredictable. We need to be ready to face challenges, so preparation and planning are critical components of effective pedagogy. By initiating an inquiry step, instructors ensure that their pedagogies are actionable based on available means. In addition, factors identified in the inquiry step are classified into constants and variables (Whittle et al., 2020). Based on Taha et al. (2020), this phase requires a systematic planning approach involving all stakeholders. Although the Covid-19 outbreak left little time for planning, it has highlighted scenario planning as an urgent need for academic institutions. We should plan comprehensively, so that if plan A fails, plan B is ready. The key is to prioritize critical and challenging situations that might occur and then plan accordingly (Dhawan, 2020; Murphy, 2020).

Design

Based on obtained data, during the design phase, instructors design the appropriate BL model according to answers to the following questions:

- **What technologies are available?** What are their affordances and limitations? How do these technologies relate to those used previously?
- **What curriculum applies?** What does it require? Is this a new concept for our students? What standards apply?
- **What do our students need?** Is this a new technology for our students? How can we individualize instruction? What helps our students learn?

Disasters and pandemics such as Covid-19 can create much fear and tension. To counterbalance these reactions, academic institutions should study proposed e-learning tools and technology deeply, with due diligence taken in weighing its pros and cons. Different educational initiatives require different technologies—in turn requiring plenty of research to ensure appropriateness (Dhawan, 2020; Henda, 2020; Kanneganti et al., 2020).

Implementation

Based on answers to questions in the design phase, instructors should consider flexibility and interactivity when initiating BL implementation, especially since some learning types and teaching activities are difficult to transfer into online learning: drawing, modeling, and performing techniques; manufacturing technology, physical exercises, creative tasks, role-playing games, and various trainings. Notably however, entire academic disciplines are not excluded from BL because all disciplines include various types of instructional activities. In architectural education, for example, an introduction to design theory's basic principles can be transferred online. In design studios, training can be provided based on instructor-guided practice or projects.

Analysis and Evaluation

Predictions that the Covid-19 pandemic might stretch into future academic years (Kanneganti et al., 2020) have heightened the significance of BL's continuous analysis, evaluation, and improvement (Megahed & Hassan, 2021). Thus, a strengths, weaknesses, opportunities, and challenges (SWOC) analysis of online learning provides a short survey on learning and organizational settings as well as on its technical, societal, and environmental aspects (Table 1).

Emergency Planning Considerations

The global Covid-19 pandemic has brought about mass social isolation, raising many questions of institutional access when government policy mandates or strongly suggests campus closures. During this tough time, the concern is not whether the online pedagogical approach can provide quality education, but rather how academic institutions can massively adapt to online learning. As university campuses reopen, the health of all faculty members, students, and societies is the primary concern (Hodges et al., 2020). Higher institution councils need to consider local and global health recommendations to mitigate Covid-19 risk. At the same time, emergency planning should be considered to provide instructional consistency should short-term university closures occur. Most guidance and recommendations are associated with three scenarios (Table 2) that will help in planning the next few academic years: a) return all students to university campus following the most current CDC recommendations and WHO guidelines; b) return students to university campus implementing BL following previous recommendations and guidelines; and c) no students return to campus buildings, thus implementing fully online learning (Jones et al., 2020).

FINAL THOUGHTS FOR POST-PANDEMIC PEDAGOGY

The Covid-19 response is not the first time that emergency e-learning programs have been considered as appropriate crisis-response measures, but this crisis will cause academic institutions that were previously reluctant to change, to accept modern technology. With the help of online teaching, we can reach many students anytime, anywhere. Globally, many universities have fully digitized their operations, understanding the current situation's dire need (Basilaia et al., 2020; Dhawan, 2020; Murphy, 2020). In this context, when redesigning future courses, instructors should ask themselves where on the BL continuum they want their learning to be and what models they will implement. Although this situation is stressful, when it has passed, higher education institutions will emerge with opportunities to evaluate how well they implemented BL strategies to maintain educational continuity. To help instructors in this process, based on the literature (Christensen et al., 2013; Horn & Staker, 2014; Jones et al., 2009), this study proposed a BL classification framework to address: a) the BL continuum, b) BL models according to place, distance, and technology, and c) BL characteristics, design options, and learning theories through various smart learning environments. As shown in the classification framework (Figure 4), the BL continuum provides instructors an idea of the many ways they can blend online with face-to-face learning. Indeed, the BL continuum begins without

Table 1. SWOC analysis of online learning

Analysis	Strengths	Opportunities	Weaknesses	Challenges
Learning settings	<ul style="list-style-type: none"> - Learning on demand, anytime, anywhere. - Flexibility of time, location. - Synchronous and asynchronous communications. - Immediate student feedback, queries. - Learn interestingly. - Quick, easy access to resources, new tools, methods. 	<ul style="list-style-type: none"> - Catering to wide audience. - Creating a collaborative, interactive learning environment. - Users can be of any age. - Strengthen skills: problem solving, critical thinking, adaptability. 	<ul style="list-style-type: none"> - Lack of learner engagement (requires self-management, self-discipline). - Lack of personal/physical attention. - Requires highly skilled (content, technology, e-moderation) trainers. - Difficulties in understanding instructional goals. 	<ul style="list-style-type: none"> - Information overflow. - Time management for students' non-serious behavior (time, flexibility). - Older professors' lack of knowledge, expertise in online education delivery.
Organizational settings	<ul style="list-style-type: none"> - Wide availability (courses, tools, content). - No time, location constraints. - Easily accessible, and can reach rural, remote areas. 	<ul style="list-style-type: none"> - Organizational, individual flexibility. - Designing flexible programs. - Improved archiving, access. - Cheaper mode of education. 	<ul style="list-style-type: none"> - Difficulties in monitoring. - Quality questioned. - Credibility. 	<ul style="list-style-type: none"> - Low acceptance. - Quality of education. - Technology cost, obsolescence. - Funding worries.
Technical aspects	<ul style="list-style-type: none"> - Online access anytime, anywhere. - Communication, semantic indexing. - Innovative pedagogical approach. - Radical transformation in all aspects of education. 	<ul style="list-style-type: none"> - Scope for innovation, digital development. - Well-structured meta-data. - Avoid printing issues. - Less paper manufacturing. 	<ul style="list-style-type: none"> - Technical difficulties, incompatibility. - Connection speed. - Data entry. - Performance of digital learning devices. - Technical difficulties in final exams. - Downloading errors, issues with installation, login problems, problems with audio, video. 	<ul style="list-style-type: none"> - Limited use due to technical constraints. - Digital illiteracy. - Unequal distribution of ICT infrastructure.
Societal aspects	<ul style="list-style-type: none"> - Students benefit in convenience, cost. - Institutions use of economies of scale, expand their enrollment catchment areas. - Avoid physical contact in Covid-19. 	<ul style="list-style-type: none"> - Relatively cheaper mode of education, lower transportation, accommodation costs; overall cost of institution-based learning. - Saving travel time for instructors and learners. - Safety in pandemics, disasters. 	<ul style="list-style-type: none"> - Loss of direct communication, human touch. - Lack of soft skills. - Poor communication and student motivation. - Difficulty balancing work, family, social life. - Lack of physical exercise, obesity. 	<ul style="list-style-type: none"> - Sense isolation, disconnection from peers, colleagues. - Sense frustration, anxiety, confusion. - Feelings of insecurity. - Digital divide may widen gaps of inequality. - Students' high of stress levels.
Environmental impact	<ul style="list-style-type: none"> - Less printer ink. - Less gas for transportation. - Saving power and energy for heating, cooling physical classrooms. - Lowered need for plastic, metal, wood, building materials, other nonrenewable resources. 	<ul style="list-style-type: none"> - Reducing carbon footprints. - Protect the environment by reducing waste (paper production, printer ink, cartridges). - Limit use of a nonrenewable natural resource. - Less carbon dioxide emission. 	<ul style="list-style-type: none"> - Greater use of electronic devices, power. - More electronic waste (contain potentially harmful materials) that requires specific, safe disposal to avoid environmental hazards. 	<ul style="list-style-type: none"> - Less interest in engaging with course/program, losing students with a sense of community and supportive accountability.

Source: Adapted from Abfalter et al. (2004), Chen & You (2010), Crowther (2013), Crawford et al. (2020), Dhawan (2020), Khalili (2020), Phirangee & Malec (2017), Reffat (2007), Song et al. (2004), and Starr-Glass (2020).

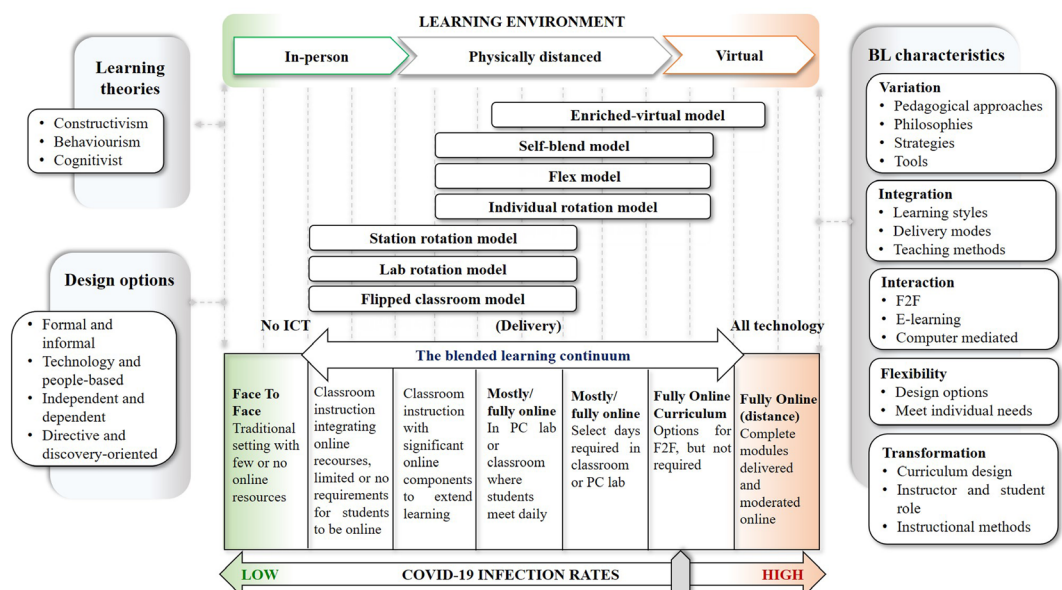
ICT, progresses through the most basic level of ICT use to support face-to-face teaching, and on to intensive use, in which an entire learning module is delivered online with minimal or no face-to-face interaction. The several BL models presented have a variety of characteristics and design options. The proposed classification framework may be implemented through many learning theories within each learning environment (in-person, physically distanced, virtual) that academic institutions might consider, given the health and safety conditions resulting from Covid-19 infection rates.

Table 2. Blended learning and emergency planning considerations for reopening educational institutions

Alert level	General conditions	Learning environment	Mode
(Green) Low	<ul style="list-style-type: none"> - Infections remain low in the local community - No known cases currently at the campus - Families, faculty, and staff closely adhere to safety protocols. - Confidence in government epidemic control 	<ul style="list-style-type: none"> - Campus open - All students on campus - Open all days - Limited cohort mixing as well as smaller class sizes and split scheduling with safety measures 	F2F
(Yellow) Moderate	<ul style="list-style-type: none"> - Infections low but starting to increase in the local community - Possible cases in the campus community - Families, faculty, and staff not adhering as closely to safety protocols - Uncertainty in government epidemic control 	<ul style="list-style-type: none"> - Campus open - All students on campus - Open all days - Elevated safety measures and PPE - Further reduction in cohort mixing 	Mostly/ fully online
(Orange) Heightened	<ul style="list-style-type: none"> - New infections increasing in the local community - Several possible cases in the campus community - Families, faculty, and staff struggling to adhere to safety protocols - Waning epidemic control 	<ul style="list-style-type: none"> - Blend of on campus and at-home teaching and learning 	
(Red) High	<ul style="list-style-type: none"> - Poorly controlled community transmission - Multiple new infections in the campus community - Government has issued stay-at-home orders or otherwise closes all educational institutions 	<ul style="list-style-type: none"> - Campus is closed except for essential faculty members and staff. - Distance learning for all students (undergraduate and postgraduate) - Cancel all onsite meetings and events 	Fully Online (distance)

Source: Adapted from Jones et al. (2020).

Figure 4. Classification framework for blended learning (Source: Adapted from Acree et al. (2017), Jones et al. (2009), Horn & Staker (2014), Rossett et al. (2003), Siripongdee et al. (2020), and Watson (2008))

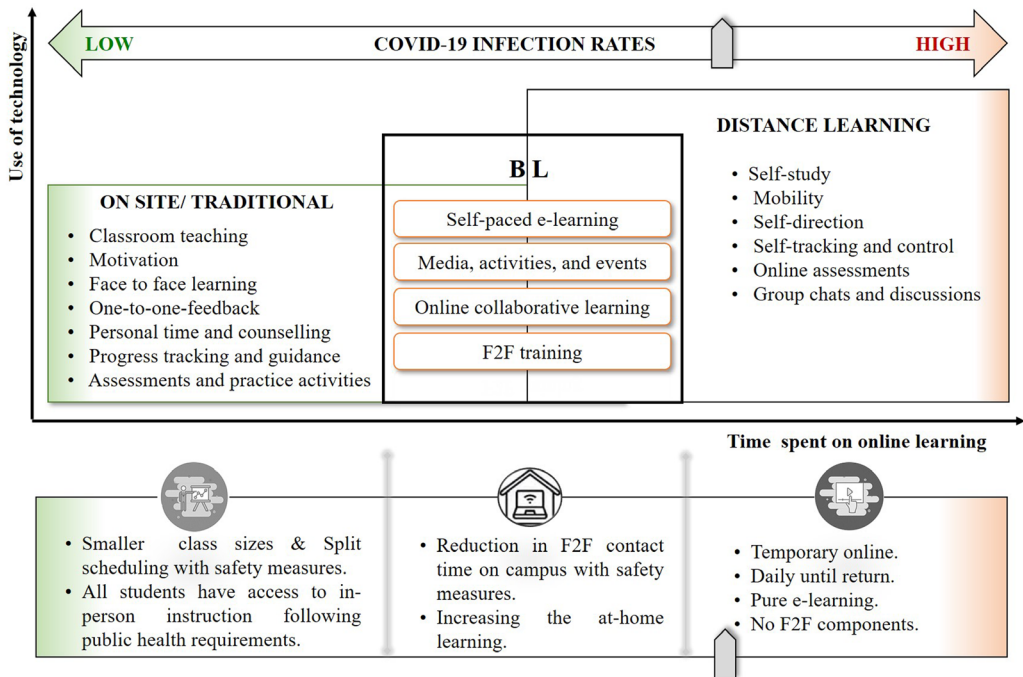


Increasing the use of technology as an educational tool implies consideration of suitable models for course design and application. BL- and ICT-based models have radically changed the instructional paradigm to more student-centered methods, using a systematic approach that combines face-to-face and online learning. Indeed, BL combines the physical classroom's effectiveness and socialization opportunities with the online environment's technologically enhanced active possibilities (Ardana et al., 2016; Hendra Divayana & Sanjaya, 2017; Megahed, 2014; Roux et al., 2018), thus providing significant potential for a pedagogical approach that combines: a) self-paced e-learning, b) media, activities, and events, c) online collaborative learning, and d) face-to-face training when the campus is open (with elevated safety measures and PPE during the pandemic). Due to current social distancing measures, however, academic institutions struggle with incorporation and adaptation of appropriate BL pedagogical principles. We believe that the future will provide significant opportunities to learn from currently ongoing, if hurried, pedagogical developments to strengthen post-pandemic pedagogy.

Consideration of BL in post-pandemic pedagogy relies on a set of associated concepts: continuum, strategies, and learning theories. Moreover, these concepts' definitions evolve based on available educational technologies and the current Covid-19 pandemic. With this in mind and based on the literature (Ghirardini, 2011; Jones et al., 2020; Heinze & Procter, 2004), this study developed a conceptual matrix to organize the several related issues. As presented in Figure 5, this matrix charts BL approaches, use of technology, time spent in online learning, and, finally, health and safety conditions based on Covid-19 rates.

Obviously, the Covid-19 pandemic has given rise to the crucial need to protect our students, faculty members, and societies. While doing that important work, we have been given a crash course in online learning's potentialities for future education. However, several arguments are associated with e-learning.

Figure 5. Conceptual matrix of blended learning based on health and safety conditions (Source: Adapted from Ghirardini (2011) and Heinze & Procter (2004))



The threat of low, or even no acceptance of online learning because of unstructured settings or technical aspects represents major weaknesses and challenges. As summarized in the SWOC analysis, we cannot ignore online education's perquisites in times of crisis. In fact, we should identify its strengths and use them to bolster opportunities for growth. After some time has passed, we will find optimum strategies. However, current literature (Dhawan, 2020; Keeton, 2004; Kim & Bonk, 2006; Partlow & Gibbs, 2003; Starr-Glass, 2020; Song et al., 2004; Stevens, 2020) reports solutions for some of the difficulties. For instance, some can be resolved by prerecording video lectures, testing content, and always having plan B ready so that the teaching–learning process is not unduly interrupted. Regarding learning and organizational settings, studies have suggested that institutions must focus on pedagogical issues and emphasize collaborative learning, using constructivism, behaviorism, and cognitivist approaches. As always, course quality should be continuously improved, and instructors must try their best to design BL courses that are creative, dynamic, interactive, student-centered, and group based. All in all, efforts should be made, to the best extent possible, to humanize the learning process.

Finally, although BL offers myriad opportunities for synchronous classroom activities, it shares common ground with a purely online format, in that both rely on online delivery. But the nature of students' interactions with online materials is challenging. The practical sciences, for example, medicine and engineering, are the most difficult to transition online, partly because students need and want two-way interaction. Such learning processes cannot reach their full potential until students practice what they learn, but online content tends to remain theoretical. Therefore, this study pursued enhancement not of teaching but, as stated in the introduction, of post-pandemic *pedagogy*. Using the term *pedagogy* reminds us that our work is still very much in progress.

CONCLUSION

Even before the first case of Covid-19 was diagnosed, technological innovation had well begun to change education, but the crisis has accelerated the drive to use new digital tools and forced changes in higher education on a likely unprecedented scale. While to a great extent, these tools and platforms existed years before Covid-19, they have never been used as purposefully as they are now. Against this background, the authors have conducted a literature search that highlights this radical change and reviewed BL as an appropriate crisis-response measure. To this end, the study first proposed a scenario planning framework for reopening educational institutions. Second, the study developed a classification framework that addresses BL's continuum, models, and learning theories through a smart learning environment. Third, the study proposed a conceptual matrix of BL that considers health and safety conditions resulting from Covid-19 rates. However, what is known about Covid-19's impact on higher education is only a partial glimpse of reactions to the pandemic; concerns about the continuing SARS-CoV-2 virus are expected to continue for at least the next few academic years. It may well be that current events will remain the new normal and profoundly reshape the very nature of pedagogy and the purpose of higher education. Most significantly, any BL development constitutes a unique experience—there is not just one packaged solution for all situations. Despite the Covid-19 pandemic's many challenges, there are potential opportunities and positive lessons about BL. Even so, weighing the pros and cons of technology and harnessing its potential are crucial actions. In our search for how best to enhance post-pandemic pedagogy, the word *pedagogy* itself reminds us of its optimum development's many struggles.

Conflicts of Interest

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

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Corresponding Author:

Correspondence should be addressed to Naglaa Megahed, naglaaali257@eng.psu.edu.eg

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Naglaa Ali Megahed is a professor of architecture. She serves as the head of the department of architecture and urban planning, Faculty of Engineering, Port Said University, Egypt. Her research and teaching focus on history and theory of architecture, building technology, architectural education, and sustainable architecture. In addition, her recent publication is "A blended learning strategy: reimagining the post-Covid-19 architectural education" (Archnet-IJAR, Vol. ahead-of-print No. ahead-of-print. <https://doi.org/10.1108/ARCH-04-2021-0081>).

Ehab M. Ghoneim is a professor of ophthalmology. He is currently a vice dean for community services and environmental development affairs, Faculty of Medicine, Port Said University, Egypt. His teaching focus on ophthalmology, cataract, glaucoma, refractive surgery, and health and environment. In addition, his recent publication is "Indoor Air Quality: Rethinking rules of building design strategies in post-pandemic architecture" (Environmental Research, Volume 193, February 2021, 110471, <https://doi.org/10.1016/j.envres.2020.110471>).