

Guidance on Flexible Learning during Campus Closures

Ensuring Course Quality of Higher Education in COVID-19 Outbreak

April, 2020, Version 1.2



**Guidance on Flexible Learning during Campus Closures:
Ensuring course quality of higher education in COVID-19 outbreak**

© Smart Learning Institute of Beijing Normal University (SLIBNU), 2020

Rights and Permissions



This publication is available in Open Access under the Attribution-ShareAlike 3.0 IGO (CC-BY-SA 3.0 IGO) license (<http://creativecommons.org/licenses/by-sa/3.0/igo/>).

Please cite the work as follows:

Huang, R.H., Liu, D.J., Guo, J., Yang, J.F., Zhao, J.H., Wei, X.F., Knyazeva, S., Li, M., Zhuang, R.X., Looi, C.K., & Chang, T.W. (2020). Guidance on Flexible Learning during Campus Closures: Ensuring course quality of higher education in COVID-19 outbreak. Beijing: Smart Learning Institute of Beijing Normal University.

Guidance on Flexible Learning during Campus Closures:

Ensuring course quality of higher education in COVID-19 outbreak

April 17th, 2020

International Research and Training Center for Rural Education, UNESCO

Institute for Information Technologies in Education, UNESCO

Smart Learning Institute, Beijing Normal University, China

Preface

UNESCO stated that, as of 16 April, school closures in many countries worldwide during the spread of COVID-19 have led to 1,575,270,054 learners being excluded from the normal learning process. Lots of countries have initiated several strategies to contain this virus, including school closures.

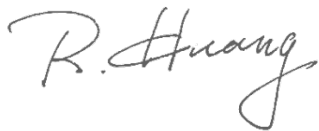
In order to promote undisrupted learning at this critical moment, SLIBNU, in association with UNESCO IITE, has initiated a project on compiling a series of handbooks on flexible teaching and learning. On 13th March, SLIBNU has announced the first “Handbook on Facilitating Flexible Learning During Educational Disruption: The Chinese Experience in Maintaining Undisrupted Learning in COVID-19 Outbreak” for organizations. This handbook describes seven flexible online learning strategies in COVID-19 outbreak intended for adoption at the country, region, or school level. On 27th March, SLIBNU announced the second handbook of “Guidance on Active Learning at Home in Educational Disruption: Promoting student’s self-regulation skills in COVID-19 outbreak” for students. This second handbook presents a SCIENCE model for children learning actively at home during school closures.

According to UNESCO, many countries have announced various measures for preventing the expansion of COVID-19 in university campuses. These include plans that enable the continuity of the curricula through virtual campuses, the media, or other digital environments, as well as the rescheduling of academic calendars. On 10th April, the Higher Education Sector of the Ministry of Education of China, held a meeting to summarize the experiences of online teaching during the period of COVID-19. According to the data from MOE of China, 1454 universities adopted online platforms to deliver undisrupted instruction, with the deployment of 7133 thousand online courses accessed by 1.18 billion university students. According to Yan Wu, the director of the Higher Education Sector of Ministry of Education of China, an international online learning platform will be built to serve as a resource to help support the world’s higher education needs, and to help global learners with China’s high-quality curriculum resources.

For university teachers, how to face the challenges of migrating offline instruction to online learning, and what kind of instructional strategies, learning resources, digital tools, and assessment methods could be used for flexible online learning, should be considered in this period of campus closures. Therefore, the third handbook of “Guidance on Flexible learning during Campus Closures: ensuring Course Quality of Higher Education during COVID-19 outbreak” is compiled as a resource to help university teachers in facilitating flexible learning.

With campus closures, teachers in university should adopt multiple online learning platforms and tools to deliver education. In order to ensure the quality of education, this guidance provides suggestions from the perspective of lesson plans, delivery methods, learning materials, and tools preparation, learning activity design, and learning outcome evaluation. This guidance also seeks to leverage technology to deliver flexible learning to transform higher education for ensuring the quality of learning in this critical moment.

On behalf of UNESCO International Research and Training Centre for Rural Education (UNESCO INRULED) and UNESCO International Centre for Higher Education Innovation (UNESCO ICHEI), we would like to thank our partners from China and abroad. Our special thanks go to the National Commission of the People's Republic of China for UNESCO for their incredible support during the realization of this publication. We also acknowledge with gratitude contributions for this publication from our partner organizations, including UNESCO IITE, the Smart Learning Institute of Beijing Normal University (SLIBNU), Centre for Research and Development in Learning at Nanyang Technological University (CRADLE@NTU), the Arab League's Educational, Cultural and Scientific Organization (ALECSO), the International Association of Smart Learning Environment (IASLE), and Edmodo.



Dr. Ronghuai Huang

Director, UNESCO International Research
and Training Centre for Rural Education



Dr. Ming Li

Director, UNESCO International Centre for Higher
Education Innovation



Acknowledgement

Many people have helped us in the preparation and writing of this guidance. They deserve our great appreciation for the long hours and hard work they have devoted to conducting the associated research and developing the contents herein. Without their incredible assistance, this book would not have been realized.

We would like to acknowledge the help of several researchers who also contributed content as well as to the organization of the webinar in which this handbook was first announced, namely Galina Konyaeva, Ahmed Tlili, Zhiying Nian, Bojun Gao, Zhisheng Li, and Qian Cheng. We would also like to acknowledge the contribution of multiple international partners, researchers, and staff who provided new ideas for this handbook during the organized webinar.

Thanks also go to experts from the Smart Learning Institute of Beijing Normal University (SLIBNU), UNESCO International Research and Training Center for Rural Education (UNESCO INRULED), UNESCO Institute for Information Technologies in Education (UNESCO IITE), International Centre for Higher Education Innovation under the auspices of UNESCO (UNESCO ICHEI), Centre for Research and Development in Learning at Nanyang Technological University (CRADLE@NTU), International Association of Smart Learning Environments (IASLE), Arab League's Educational, Cultural and Scientific Organization (ALECSO) and Edmodo for their professional feedback and comments during the preparation of this guidance.

Contents

Executive Summary	1
1 Lessons Planning of Flexible Learning during Campus Closure	2
1.1 Leveraging digital technology to enhance learning	3
1.2 Employing strategies of blended learning	7
1.3 Designing learning activities for flexible learning	9
2 Choosing Appropriate Delivery Methods for Flexible Instruction	12
2.1 Webcasts in education	12
2.2 Learning with MOOCs	20
2.3 Flipped instruction with video clips	25
2.4 Group learning	32
2.5 Joint online course	38
3 Preparing Materials and Tools for Learning and Teaching	40
3.1 Using digital resources as learning materials	40
3.2 Adopting digital tools for learning and teaching	44
4 Facilitating Flexible Learning with Diverse Activities	50
4.1 Promoting interaction and communication	50
4.2 Deepening meaningful learning	66
4.3 Motivating learner and scaffolding learning	70
5 Checking Learning Outcomes and Evaluating Accordingly	79
5.1 Categories of learning outcomes	79
5.2 Utilizing appropriate instruments for assessment	85
Conclusion	97
References	100
Participant list	110

Executive Summary

UNESCO stated that, as of 16 April, school closures in many countries worldwide during the spread of COVID-19 have resulted in 1,575,270,054 learners being excluded from the normal learning process. Lots of countries have initiated several strategies to contain this virus, including school closures. Measures for preventing the expansion of COVID-19 in university campuses are adopted, and curricula are delivered through virtual campuses, the media or other digital environments.

For university teachers, they have to stay at home and deliver lectures via the Internet, which may cause some challenges for some teachers, especially for those who are not familiar with the needs of modern education and the methods of integrating technology into education. In fact, in some places, many universities are still adopting the old-fashioned model of delivering lectures for passive audiences, thus failing to harness to the educational possibilities affordances afforded by emerging technologies. At this critical moment, it is an excellent opportunity for rethinking teaching and learning, and for leveraging technology to transform the old-fashioned models for preparing students for the future.

To facilitate university teachers for conducting flexible instruction to ensure the quality of learning at this critical moment, the guidance has identified some academic terms, guidelines, tips, and stories for teachers, namely: (a) Making flexible lesson plans and learning activities. It is crucial to utilize multiple strategies to design learning activities and implement the design by considering the characteristics of online or blended learning environments. (b) Delivering instruction in diverse technology-enhanced ways. Webcasts in education, learning with MOOCs, flipped instruction, group learning, and joint online course will be elaborated in some detail. (c) Adopting abundant digital resources and appropriate tools for learning. The choice of the most suitable digital learning tools should be based on considerations of licensing, accuracy, interactivity, ease of adaptability, and cultural relevance and sensibility. (d) Designing learning activities to promote interaction, enhance engagement and improve motivation. How webinar, online discussion, project-based learning, online debate, brainstorming, experiential learning with virtual space, and gamifying of learning, can be used and designed for promoting interaction, will be discussed. (e) Evaluating the learning process and outcome in appropriate ways. We will discuss the possibilities of online examination, rubrics, self-checklist, learning contract, e-portfolio, learning analytics, and AI-assisted assessment, for enabling or supporting assessment.

Finally, five implications are discussed for promoting higher education in a sustainable way for a long term. (a) Rethinking higher education. (b) Changing the roles of educators. (c) Integrating formal and informal learning. (d) Bridging the achievement gap of students. (e) Transforming pedagogy through new technology.

1 Lessons Planning of Flexible Learning during Campus Closure

Lesson plan is the basis of effective teaching, which is generally a teacher's description of the instruction of a course for an individual lesson. Planning Lesson is one of the most important skills for every teacher, also for university teachers. There are many ways to plan a lesson, however, each lesson plan should include some or all of the elements listed as follows.

- Construct the specific contents for the lesson and scheduling each lesson.
- Collect the learning materials, which includes student handouts, textbooks, visual aids, grading rubrics, activity packets, etc.
- List the learning objectives/outcomes, which should be specific, measurable, attainable, and relevant.
- Design the lead-in to the lesson, which aims to focus learners on concepts or skills to be learned.
- Describe the instructional component, which elaborates on the instructional behaviors and steps as the lesson is delivered.
- Plan the independent practice or group work, which allows learners to practice what they have learned or extend knowledge.
- Sketch the summary, for teachers to wrap up the lesson and students to raise unanswered questions.
- Outline the assessment, to measure whether students learned the knowledge or skills in the lesson and met the lesson objectives.

However, in the period of campus closure, students are mainly learning online and teachers have to do the lesson plan according to the characteristics of online learning and teaching.

In **online learning**, students can use the online learning content that they find in multiple formats (e.g., video, audio, document, etc.) for learning in different ways with different objectives. Additionally, they can also choose the learning pace according to their own need, by directing and evaluating with the assistance of a teacher. This interaction can take place within a community of inquiry, using a variety of internet-based synchronous and asynchronous activities (video, audio, computer conferencing, chats, or virtual world interaction). These asynchronous and synchronous online environments could promote the development of social and collaborative skills, as well as personal relationships among participants.

Understanding the features of online teaching and utilizing multiple appropriate technologies and tools to produce lesson plans accordingly is becoming a challenge for university teachers all over the world. It is especially obvious in this period of university closure. The following sections will introduce how to leverage digital technology to produce technology-enhanced lesson plans.



Term 1. Online learning

Online learning is defined as learning experiences in synchronous or asynchronous environments using different devices (e.g., mobile phones, laptops, etc.) with internet access. In these environments, students can be anywhere (independent) to learn and interact with instructors and other students (Singh & Thurman, 2019).

1.1 Leveraging digital technology to enhance learning

During university closure, instructors are teaching online, and learners are studying online. Effective teaching methods are more critical in such situations when the teacher and students are separated in physical distance, and video/audio conferencing systems are used to deliver the instruction.

According to Borich (2014), five key behaviors contributing to effective teaching are lesson clarity, instructional variety, task orientation, student engagement, and opportunities for success, which should be revisited when teaching online.

Five direct behaviors for effective teaching and the indicators pertaining to them are listed as the following for reference:

- **Delivering the lesson in a clear way:** logical, step-by-step order; clear and audible delivery free of distracting mannerisms.
- **Making instruction variety:** variability in instructional materials, questioning, types of feedback, and teaching strategies.
- **Orientating with learning tasks:** achievement (content) orientation as opposed to process orientation, maximum content coverage, and time devoted to instruction.
- **Engaging Student in learning:** limiting opportunities for distraction and getting students to work on, think through, and inquire about the content.
- **Providing opportunities for students' success:** ensure that students' 60% to 70% of time spent on tasks could provide them with moderate-to-high levels of success, especially during expository or didactic instruction.

The following are five helping behaviors for effective teaching and some indicators pertaining to them:

- **Using learners contributions and ideas:** Using learners' responses to promote the goals of the lesson and letting students elaborate on and extend the learned content by using their own experiences, ideas, and thought patterns.
- **Structuring the content:** Providing advance organizers and cognitive or mental strategies at the beginning of a lesson and creating activity structures with varied demands.
- **Questioning:** Using both content (direct) and process (indirect) questions to convey facts and to encourage inquiry and problem solving.
- **Probing:** Eliciting clarification, soliciting additional information, and redirecting when needed.
- **Teacher affect:** Exhibiting vigor, involvement, excitement, and interest during classroom presentations through vocal inflection, gesturing, eye contact, and animation, communicating a warm and nurturing relationship to the learner.

The quality of teaching and learning depends on the instructor's ability to utilize multiple technologies and tools to **reorganize the teaching and learning process.**



Term 2. Instructional design

Instructional design (ID), also known as instructional systems design (ISD), is the practice of systematically designing, developing and delivering instructional products and experiences, both digital and physical, in a consistent and reliable fashion toward an efficient, effective, appealing, engaging and inspiring acquisition of knowledge (Merrill et al., 1996).

Teachers should help learners to understand the nature, regularity, and the inner connections among things. From a constructivist perspective, learning is the process of constructing an internal psychological representation of the world in the process of interaction with the environment. The basic elements of constructivism include context, conversation, collaboration, and meaning-making.

From the perspective of constructivism, learning could be understood in the following ways (Huang, Spector, & Yang, 2019).

- Learning is or should be learner-centered.
- Learning is the process by which students construct their internal psychological representation actively.
- The learning process consists of two facets: the reorganization and reconstruction of old knowledge and the meaningful construction of new knowledge.
- Not only is learning an individualized behavior, but also a social and language-centered behavior; learning requires communication and cooperation.
- Learning includes emphasizing the situation of learning and attributing importance to the creation of meaningful situations to support learning.
- Effective learning asks for appropriate resources to support meaning construction.

According to constructivism, teachers could not teach in the traditional ways, but should encourage students to cooperate or interact with peers. Students should process information and construct the meaning of knowledge actively on their own, rather than listen to teachers passively. The impact of constructivism on teaching is listed as follows:

- **Pay attention to the design of the learning scenario.** The teacher could design multi-dimensional learning scenarios, so that learners could understand the concept and principles from various aspects, and therefore develop problem-solving, decision-making, and innovation capabilities.
- **Emphasize the learner's active role.** Focus on promoting students' self-management skills to stimulate the necessary psychological state and prior knowledge for learning.
- **Pay attention the contribution of the erroneous concepts in the overall process of learning.** Situated cognition theory treats the aim and process as a unity. Therefore, while the erroneous understanding of concepts may emerge in the process of learning, it can be channeled as a positive contribution to the construction of the whole knowledge understanding.

Traditional instructional design methods could be incorporated with digital technology to maximize learning within a digital environment of sound lesson plans that could offer students flexible options of learning in this critical moment. For technology-enhanced instruction, it is important to ensure the effective use of media in instruction. In selecting teaching strategies and media, first, you should figure out which delivery method is best for your instruction, instructor-centered or student-centered, or teacher-led and student-centered? After selecting the teaching strategy, it's time to figure out which technology, media, and materials could best support the method of teaching that you have chosen. After you choose the technology, it is good to do a test of the technology before the class, and make sure that the whole lesson will go smoothly and seamlessly.

For online learning, it is conducted in either synchronous or asynchronous ways. Synchronous learning happens with teachers and learners interacting at the same time, while asynchronous learning allows student's self-paced schedule with participants interacting at different time. Instructors could decide the form of online learning according to their needs. Generally, the following laws could be considered for planning a technology-enhanced lesson (Huang, Liu, Tlili, Yang, & Wang, 2020).

- **On Access to Digital Learning Resources (related to learning resources).**

The resources should satisfy the following basic conditions: (a) The contents are of learners' interests or necessary for them to solve problems; (b) The contents are of moderate difficulty and in an appropriate scale, so that cognitive "overload" will not occur; (c) The structure of the contents is simple and clear, which will reduce the cognitive load of learners; (d) The content is well designed to avoid visual strain;

- **On Virtual Learning Communities (related to learning environments).**

The following three basic conditions are required for building the virtual learning environment (VLE): (a) Build a trustful learning environment, via providing continuous encouragements, so learners feel a sense of "belonging to the group and environment"; (b) Provide timely feedback to learners, so they can find the answers and acquire a sense of achievement in the VLE; and, (c) Allow learners to gain a sense of emotional identification and release their desire of "competition" or "performance."

- **On Learners Asking for Help (Related to users).**

In order to make learners more motivated to ask their teachers for help when encountering difficulties, there are three necessary conditions: (a) Appropriate external encouragements (from the teachers, administration, etc.); (b) The intimacy between teachers and students; and, (c) Timely and effective feedback.

1.2 Employing strategies of blended learning

In the period of campus closure, online learning, either synchronous or asynchronous, is adopted by lots of universities. But, we should notice that students will go back to campus after the period. Therefore, the blended way of learning that incorporated both face-to-face and online learning could be utilized, and the characteristics of **blended learning** should be recognized.

In online learning, students work independently on online lessons, projects, and assignments at home or elsewhere, with online/offline face-to-face meetings with teachers to review their learning progress, discuss their work, ask questions, or receive assistance with difficult concepts. We should keep in mind that students may encounter lots of problems when learning online, and they are more familiar with the traditional face to face instruction. In this sense, teachers could consider the traditional learning methods and transfer to online in a students' familiar way of learning. Then the blended learning method could be utilized.

Blended learning is also known as *hybrid learning* or *mixed-mode learning*. Blended-learning experiences may vary widely in design and execution from university to university. "Face-to-face" instruction includes those courses with 0 to 29% of the content delivered online, which includes both traditional and web facilitated courses. The remaining alternative, online courses, are defined as having at least 80% of the course content delivered online, while blended learning is defined as having between 30% to 79% of the course content delivered online.

During the educational disruption, live video, video-recorded lectures, text chats, and other digitally enabled learning activities may be a student's primary interactions with content and teacher, and the flexibility of blended learning is reflected in the following several aspects.

● Time and location of learning

It means that the time of participating in a course (Collis, Vingerhoets & Moonen, 1997), starting and finishing a course (McMeekin, 1998), and participating in learning activities (Collis et al, 1997; Collis & Moonen, 2004; Casey & Wilson, 2005) can be flexible. And the pace of study (Collis & Moonen, 2004; Casey & Wilson, 2005) also can be flexible.



Term 3. Blended learning

Blended learning is defined as a formal education program in which a student learns at least in part through online delivery of content and instruction with some element of student control over time, place, path, and/or pace and at least in part at a supervised brick-and-mortar location away from home (Staker & Horn, 2012).

Learners can be offered choices based on their needs (e.g., study during evenings or on weekends). They can also specify the time they want to interact with others and the time they want to study on their own. The location of learners to carry out learning activities and access learning materials can also be flexible anywhere at any time via digital devices (Collis et al, 1997; McMeekin, 1998; Gordon, 2014).

● **Learning content**

It allows students to determine the sections and the sequence of content according to their desire, pathways of learning, forms of course orientation, size and scope of the course through modularization of the content (Collis et al., 1997; Collis & Moonen, 2004; Casey & Wilson, 2005; Gordon, 2014).

● **Delivery mechanism**

Flexible delivery offers a suitable range of how and where students can access learning materials (Collis et al., 1997; Lundin, 1999; McMeekin, 1998). Students may experience the course in web-based learning via different technologies, such as synchronous live broadcasting, asynchronous lectures, virtual experiments, and augmented reality.

● **Instructional approaches**

The learner's choices can be offered using several instructional approaches, such as lectures with tutorials, independent study, discussion, seminar groups, debates, student-led discovery approaches, and educational gamification (Gordon, 2014).

● **Assessment methods**

The assessment and evaluation of learning quality, as well as teaching and academic programs (Collis et al., 1997; Casey & Wilson, 2005), can be flexible. The flexibility can be indicated by the methods of assessments, such as presentation, a short-filmed presentation, a research paper, team projects, peer assessments, and standardized tests (e.g., multiple choices). E-portfolio is one method that can offer more flexibility for students to update the evidence of their development and achievement (Gordon, 2014). The timing and delivery channel of assessment can also be flexible. Flexible learning can be provided by applying learning analytics approaches, which will collect the students' learning traces (within the learning system) to provide real-time assessment and visualize the results in the form of reports or dashboards.

The flexibility of blended learning could be considered when planning the lessons. At the same time, the general principles of blended learning could also be reviewed. First, according to Sands (2002), the first principle for developing a blended learning course is to “work backward from the final course goal...to avoid a counterproductive focus on technology”. Second, we should focus on interaction (student to student and student to teacher) rather than the delivery model of the lesson. Third, it is important to redesign the learning activities that carry over to the classroom and back online. Forth, consider the problems you encounter in the traditional classroom, then integrate technology to solve the problem online. Fifth, remember to start with simple techniques and tools.



Tip 1. Strategies for conducting effective blended learning

There are some strategies to help you merge synchronous and asynchronous learning strategies, and develop effective blended learning environments.

- Clearly identifying the objectives of the blended learning course.
- Creating a blended learning course outline and syllabus to keep learners motivated and on-track.
- Determining the level of interactivity for the blended learning course.
- Integrating group collaboration activities in learning tasks.
- Developing communication and feedback guidelines.
- Compiling a list of resources and references.
- Creating effective assessment plans.

Source: <https://elearningindustry.com/7-tips-create-effective-blended-elearning-strategy>

1.3 Designing learning activities for flexible learning

In order to ensure the quality of **flexible learning**, the following model that depicts the design procedures could be followed. The ultimate goal of this model is for instructional implementation. The procedures are made up of three main components: (a) pre-analysis; (b) activity and resource design; and (c) instructional assessment.

Pre-analysis. These analysis are composed of three factors: (a) analysis of learner characteristics, in terms of regular assessment of learners' prior knowledge, learning styles, learning preferences, etc.; (b) analysis of learning objects (knowledge taxonomy), in terms of defining what should be taught based on knowledge taxonomy; and (c) analysis of blended learning environments, in terms of finding out the environmental features.



Term 4. Flexible learning

From the above description, flexible learning is a learner-centered educational strategy, which provides choices from the main dimensions of study, such as times and location of learning, resources for teaching and learning, instructional approaches, learning activities, supports for teachers and learners. In this way, teaching and learning can be flexible rather than fixed, to promote easy, engaged and effective learning (Huang, et al., 2020b).

Design of Activities and Resources. This component consists of three sub-components, which are the overall design of blended learning, unit (activity) design, as well as resource design and development.

Instructional Assessment Design. The assessment design depends on the activity objectives, performance definition, and the general environment of blended learning.



Tip 2. The design procedure for flexible learning

The design procedure for flexible learning

- **Design of unit:** divide the course into several teaching units by “knowledge modules”, each of which can be completed by one or more classes.
- **Design of strategies:** analyze the goals, types of knowledge, and student status of each module, and determine teaching strategies such as “teaching,” “self-study,” “exploring,” “experience,” “problem solving,” and so on.
- **Design of activities:** learning activities are designed explicitly for each teaching unit to form a sequence of learning activities in course.
- **Collecting resources:** find suitable digital learning resources and prepare appropriate learning materials.
- **Design of assessment:** include learning process assessment and learning achievement assessment, like assignments, e-portfolios, final exams, and the final score components.

There are four procedures for the implementation of flexible learning: (a) lead-in; (b) lecturing; (c) self-directed learning activities; and (d) assessment. In the process of “lead-in”, you should explain the objectives and teaching arrangements, present learning activities, and learning materials, and emphasize learning tasks and ways to interact. In the process of lecturing, you should teach the content that is difficult for learners to understand by themselves, and organize discussions, group reports, or other learning activities in the online/off-line classroom. In the process of self-directed learning activities, learners will complete the tasks in small groups or individually. As the difficulty of the tasks of the department gradually increases, the complete cycle of the task, if needed for a successor task, can also be gradually lengthened. In the process of assessment, the student or students’ group reports the results and evaluates the learning experience, shares learning methods and learning experience, takes part in exams, and proposes improvement suggestions.



Tip 3. Lead-in a course at the first lesson

It is the starting point of the activity. The main objective is to demonstrate the task to learners.

- Describe the aims of the task, to inform students what they are expected to achieve after completion of the task.
 - Show the task by examples, to give students a better understanding of the task.
 - Provide resources, so that students can use them to complete the task.
 - Make instructional arrangements, to familiarize students with the general planning for how this course/unit/class will be carried out.
-

For student's group learning, it is important to first define the task by learners themselves through using their knowledge. You could guide students to define the tasks by following the steps: (a) brainstorm if in groups; (b) define the problem; (c) identify the factors or aspects for the problem ; (d) define the steps; (e) collect more information if needed; (f) solve the problem; and (g) write reports.

Finally, assessment should aim to transfer student's newly constructed knowledge to learners' future learning through sharing their work with their peers and the instructor. Lots of methods will be introduced in the following part.

Quality assurance is “the maintenance of a desired level of quality in a service or product, especially through attention to every stage of the process of delivery or production.” In the period of campus closures, to ensure the quality of higher education, strategies should be considered in choosing teaching methods, utilizing teaching and learning tools, designing learning activities, and using appropriate assessment methods, which will be elaborated in the following sections.

2 Choosing Appropriate Delivery Methods for Flexible Instruction

If we trace back the history of distance education, from correspondence education to electronic education and distance universities, it is clear that the two-way telecommunication systems are used to connect learners, teachers, and resources, since the essence of distance education is the separation of teaching and learning activities. Now that the teacher and learner are separated in this period, the suitable telecommunication tools, delivery methods and instructional strategies should be utilized to connect students, resources and teachers, which are elaborated in the following.

2.1 Webcasts in Education

With the development of the Internet, online learning such as live webcasts and MOOCs have begun to emerge and flourish, allowing students to learn by watching online courses, forming a situation where online learning and offline learning co-exist.

Webcasting is defined as “sending digital information over the Internet for reception, viewing and listening by the public, possibly involving some interaction between the sender and recipients”, it is to distribute information from one person to many other persons, by some technologies such as the published, subscribed or broadcast methodologies (Miles, 1998). There are three modes of using webcasting technology to deliver lectures to students, **live streaming/live broadcasting**, pre-recorded, and video-on-demand.

Instructional interaction, as the key in distance learning, determines whether and how distance learning occurs. Although online learning enriches students’ learning resources and expands students’ learning space and the range of active learning choices, the visual learning of the screen may suffer due to the lack of interac-



Term 5. Online live synchronous instruction

Online live synchronous instruction refers to the teaching and learning activities of instructors and students in different spaces, using the Internet and other information technologies to carry out simultaneous, simultaneous adjustment and the same progress. Generally speaking, the implementation of online live synchronous teaching requires instructors and students to use live broadcast tools or video conferencing tools to carry out audio and video communication, presentations, real-time text seminars, and other teaching activities. It has the characteristics of immediacy, low implementation difficulty and low cost of technical learning for instructors and students. (Xie et al., 2020)

tivity, leaving students with a sense of exasperation. It may be difficult for learners to adapt to this kind of informal cooperation, or to achieve self-regulated learning, and it is easy to fall into shallow learning, which affects the distance learning. Therefore, how to break the dilemma of insufficient interactivity of online learning has become the key to the further development of online education. With the rapid development of mobile technology, live broadcast technology has been introduced into the field of education, and a new “Internet +” learning form of “live broadcast/live streaming+ education” was born, which makes up for the lack of interaction in online learning. (Liu, 2017)

2.1.1 Benefits of webcasts in education

There are some main features of webcasts in education.

- From the perspective of teaching organization, webcasting can still maintain large-scale online teaching, under the condition of separation of time and space for teaching and learning. Instructors become evaluators of learning activities. Especially when webcasting with the live broadcast platform, students can propose their needs, and instructors can modify the teaching process accordingly.
- From the perspective of interaction, webcasting can enhance the interaction between teachers and students with the help of the platform function, and students can post questions or answer questions at the same time, all of which can be seen by others.
- From the perspective of students’ learning, some webcasting platforms can record the video/audio for students to play back after the classes, which is convenient for students’ review. The flexibility and interactivity of the entire learning process have been greatly enhanced, making it a veritable online interactive learning.

There are some functions that webcasting/video conference platforms can offer. (Rainbow, 2020)

- An online meeting place, where people can talk to each other with web cams and microphones.
- An online meeting place, where people can share (almost) everything that can be shared in offline places, such as texts, pdf files, video or audio, images, and slides.
- Recording the meeting: students can review the lectures again after the live session, or sharing with those absent students.

- Discussion forums: where teachers and students can post questions or answer questions, or possibly polls.
- Group/room divided: students can be divided into different groups or meeting rooms, working on some assignments or discussions together, away from other groups.

There are several benefits of webcasts that extend beyond being able to offer online learning during the COVID-19 outbreak. (Strain,2020)

● **Overcome physical boundaries for broader reach**

Webcasting can allow teachers to access students in different areas, or even across different countries. Without the boundaries of the physical classroom, teachers can still deliver the lectures and reach the students globally.

By opening a webcast, universities/colleges not only have a broader reach, but also can involve more students in the online classroom at one time, since there are not any physical constraints of the traditional classroom or lecture hall. With the webcast platform, teachers can broadcast high-quality lectures to hundreds or even thousands of students anywhere, anytime, on any device. Faculty or school can host larger webcasts to involve more students at one time, like some scheduling issues.

● **Use interactive features such as polls**

Webcasts can provide an interactive learning environment that can engage students in the online classroom. For example, teachers encourage interaction, taking advantage of the functions, like polling to keep students engaged. Polling during lectures and sharing the results in real time is a great way to engage students, and to provide an overall understanding of the content or subjects.

● **Record classes and review on-demand**

Besides, teachers can upload additional materials, such as worksheets, slides, and articles to the webcast platform for students to refer to during the class. Moreover, the recording is another function, which can be provided to students immediately after the webcast is finished. Students could play back and review the lecture on demand if they missed some notes, which can improve their engagement during class and also improve their performance.

● **Introduce guest lecturers**

Teachers or professors can invite other famous professors or experts in the industry to join their webcast as a guest presenter, which can help expand the knowledge and resources between the industries and different universities.

Webcast provides more opportunities to guest lectures due to the flexible time and space, because there are significantly fewer scheduling conflicts for an online lecture as opposed to an on-premise presentation. Some famous experts and professors can join in the online lectures without leaving their homes or workplaces, which allows them to think outside the tradition, when it comes to the curriculum and learning strategies.

Besides, for the students, it is a great way for them to enhance their educational experience, and get maximum exposure to the guest lecturer globally, as they talk about their real life experiences, instead of repeating the content from textbooks.

● **Conduct exams online**

Webcasts can also be used to organize online quizzes or assessments. Teachers can integrate some video clips and questions to make an interactive learning experience, or create a quiz or an exam after webcast is done. Teachers can access all the answers in the presenter portal, and students can get real-time results on their scores.

● **Webcasting for campus tours**

During the COVID-19 outbreak, most universities are closed or postponed to the new semester. However, universities and colleges would be busy with high school juniors and seniors touring the facilities and making their college choices. Now, universities consider hosting virtual tours via a webcast for campus recruiting. High school students can still share the best of what their university or college has to offer in a safe way with everyone involved.

2.1.2 Using webcasts in education

Preparation before the live broadcast and feedback after the live broadcast is also crucial for the whole teaching process. We list some suggestions for three stages (before the live broadcast, in the live broadcast, after the live broadcast) for you to follow:

- The first stage is before the live broadcast. This process mainly occurs offline. Instructors conduct instructional design and assign related tasks to students before the live broadcast lesson through multiple channels, such as posting questionnaires or preview materials in the form of URL or QR codes. The instructor should collect and analyze the student's feedback before the class;
- The second stage is the live broadcast. This process mainly occurs online. Instructors give live lectures in live classrooms, and students also listen to lectures online via the Internet. In this process, instructors can show them in a live lecture according to the data/feedback collected before the live broadcast. If necessary, you can also interact with online students through the platform function;
- The third stage is after the live broadcast. This process mainly occurs offline. In the past, the live webcast teaching was done after the live broadcast, but the O2O live teaching needs to post a second task to the students after the live broadcast. The students will answer online or give offline feedback to the live broadcast classroom, so that instructors can improve instructional design and provide differentiated guidance to students. (Ni & Ding, 2017)

In order to use webcasts in education, the following guidelines can be used for video conferencing from various institutions.

Table 1. Video conferencing guidelines from various institutions

Institution	Video Conferencing Uses	Rationale	Example Guidelines
Pennsylvania State University (PSU, 2006) (USA)	Faculty use video conferencing as a method of extending their classrooms to students at different locations.	“Increased availability of technology has expanded opportunities for presentations and meetings via video conferencing, which is an enhancement over earlier conferencing due to its visual and audio connections.” (PSU, 2006, p. 1)	<ul style="list-style-type: none"> • Run a test • Send written material ahead of time • Ensure proper lighting • Distribute etiquette • Have backup plan if technology fails
University of Pittsburgh (2008) (USA)	Create virtual meeting environments that allow participants at different locations to see and interact with one another.	“Video conferencing uses audio and video to bring people at different sites together for a meeting. The meeting can be as simple as a conversation between two people in private offices (point-to-point) or can involve several sites (multipoint) with many people in large rooms.” (University of Pittsburgh, 2008, para. 1)	<ul style="list-style-type: none"> • Ensure adequate lighting • Properly position microphones • Eliminate background noise • Label site • Provide copies of handouts used during Session
Stanford University (2012) (USA)	Distance learning, donor outreach, group meetings, interviews; lectures, office hours; peer reviews, study groups, virtual classrooms.	Stanford “offers three video conferencing options ... that [can be used] to meet and collaborate with colleagues across campus or around the world, reducing travel time and expense while increasing communication and sharing.” (Stanford University, 2012, “Overview,” para. 1)	<ul style="list-style-type: none"> • Copyright concerns • Professional standards for classrooms • No third-party content without permission • Do not use cumulative material • Do not include private (patient) information
Charles Sturt University (CSU, 2012) (Australia)	Teaching, research, administrative needs.	“DVC [desktop videoconferencing] at CSU provides the ability to connect to traditional scheduled room based video conferencing meetings as well as conduct ad hoc desktop video conferencing meetings with other desktop video conferencing participants.” (CSU, 2012, “Introduction,” para. 1)	<ul style="list-style-type: none"> • Security concerns • Etiquette • Encourage all to participate • Eliminate "back chatting" <p>Introduce all participants</p>

(Source: Gautreau, C. et al.(2012). Video Conferencing Guidelines for Faculty and Students in Graduate Online Courses, (2012), Journal of Online Learning and Teaching, 8(4):277:287. Retrieved from https://jolt.merlot.org/vol8no4/gautreau_1212.pdf)



Tip 4. Preparing for using a video conference/webcasting platform for teaching online:

- Audio and video testing: Before the session, please make both sound and camera tested.
- Carrying out a quick test about the activities: Try to practice what you want your students to do with your family, colleague or friend.
- Making your teaching accessible by any device: Because some students may enter the room on their phones or tablets.
- Using the full name in the online class: Nicknames are not useful when trying to record who was present.
- Be prepared for something to go wrong: Making a Facebook group, WeChat group or email group to send an instant message to students if there is something wrong.
- Staying calm and keeping a smile when something goes wrong: asking the students if anyone has any ideas and their suggestions will give you a little thinking space!
- Most of all, enjoy it!

*Source: <https://www.cambridge.org/elt/blog/2020/03/16/using-video-conference-platform-teaching-online/>
<https://edtechmagazine.com/higher/article/2019/10/how-videoconferencing-platforms-help-connect-campus-communities>*



Story 1. Video conferencing tools fill a desire to feel connected—— University of Maine System (UMS)

Students at the University of Maine System (UMS) use Zoom to collaborate with coursemates and meet with lecturers and supervisors at home. Instructors also use Zoom to invite guest speakers in—whether from Maine or another part of the world.

The Zoom licensing agreement allows all the members in the UMS community to use the tool on any device, says Angela Cook, director of classroom technology, but they also have access to Zoom-enabled rooms featuring high-end technologies enhancing the conferencing experience.

Lecture halls and other large rooms have Vaddio and Huddle videoconferencing cameras and either (hardwired) Biamp or (wireless) Revolabs microphones, while meeting rooms and seminar-style spaces have Polycom Studio cameras with built-in microphones and speakers.

USM started these installations after completing an exhaustive assessment of all classrooms systemwide and then surveying the community about technology wants and needs.

The assessment made it clear that the majority of teaching spaces were long overdue for technology upgrades, Cook recalls, while the surveys led to similar revelations around faculty and student expectations.

“What we learned was that technology like Zoom could help our students feel more connected to their courses and to the university itself,” she says. “It doesn’t resolve all of the issues we’re facing related to student and faculty engagement in a university system of this size, but we like to think it’s a really good start.”

Source: <https://edtechmagazine.com/higher/article/2019/10/how-videoconferencing-platforms-help-connect-campus-communities>



Story 2. Peking University actively carried out online teaching

During the COVID-19 outbreak, Peking University launched “5 + N” online teaching methods for students to choose. There are five online teaching modes, including live broadcasting lessons, recorded broadcasting lessons, MOOCs, seminars and classroom lessons, and several business online platforms such as Peking University teaching network, online classroom, Classin, canvas, etc. Participants included more than 2,000 teachers, covering more than 20,000 students. The total online time of teachers and students exceeds 410,000 hours, and more than 1500 courses are opened online every week. Teachers broadcast more than 15,000 hours of live broadcasts, and more than 12,000 students participated in the live broadcast courses every day.

Source: Wu, Y. (2020) Respond to crises, turn crises into opportunities, take the initiative to change, and build an international online teaching platform and curriculum resources [Powerpoint slides]. Video Conference on the Construction of Online Teaching International Platform Courses in Universities. [2020-04-10]

2.2 Learning with MOOCs

Online learning materials (such as applications and tools, documents, pictures, and videos) are the carrier for online learners to acquire knowledge and the essential learning materials for learners. They can improve the quality of the learning content provided, as well as capacity-building and knowledge sharing. They are usually published in online repositories, which in turn are defined as digital databases containing learning resources (McGreal, 2011). In these repositories, learners can search for learning materials, view and download learning materials and their metadata. The idea behind Open Educational Resources (OER) is just those online learning materials. MOOC is a kind of particular OER. During the campus closures, instructors and learners can use MOOCs independently or integrate MOOC content into other online learning and teaching.

2.2.1 OER and the National Quality Open Courses in China

The term Open Educational Resources was first coined at UNESCO's 2002 Forum on Open Courseware, and it was defined as "teaching, learning and research materials in any medium – digital or otherwise – that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions." China was one of the first Asian countries to adopt open education and its related strategies following the MIT OpenCourseWare Conference in Beijing in 2003 (Tlili, Huang, Chang, Nascimbeni, & Burgos, 2019). In order to promote the sharing of high-quality teaching resources and improve the quality of education and teaching, several initiatives have been launched in China to support the adoption and creation of OER. MOE of China initiated the National Quality Course in 2003 and National Quality Open Courses in 2011. (Huang, Liu, Tlili, Gao, & Koper, 2020).

● National Quality Course

In 2003 the MOE of China initiated the National Quality Course (NQC) to reform teaching content and enhance courses. Approximately 750 universities participated in the development of NQCs from 2003 to 2010, resulting in the development of 3,790 NQCs, of which 2,525 were general undergraduate courses, and 1,265 were vocational college and online education courses. While this initiative is noted as an OER, it is also noted that the NQCs adopted China's Copyright Law (all rights reserved).

● Construction of National Quality Open Courses (NQOC) (2011)

This initiative focuses on sharing quality educational resources, showcasing best practices in teaching, encouraging independent learning, and supporting open learning using online platforms. It also involves the building of 1,000 quality open video courses (QOVC) and 5,000 quality open resource course (QORC). The Ministry of Education provides subsidies for NQOCs, and local universities/colleges also provide

funds for the development of quality open courses.

There are several initiatives that have been launched in China to support the adoption and creation of OER, which are listed below.

Table 2. Different OER Initiatives launched in China

Name of OER Initiative	Participating Organizations	Brief Description of Initiative
Construction of National Quality Open Courses (NQOC) (2011) http://www.icourses.cn/home/	Ministry of Education Universities & colleges	Focuses on sharing of quality educational resources, showcasing best practices in teaching, encouraging independent learning, and supporting open learning using online platform. Including the building of 1000 quality open video courses (QOVC) and 5000 quality open resource course (QORC).
XuetangX (2013) http://www.xuetangx.com	Tsinghua MOOC-CN Information Technology(Beijing) CO,Ltd	XuetangX aims to provide advanced systematic education to the public and offer the opportunity for every single Chinese to enjoy the best education that is available around the world, and now over 1000 free courses from Tsinghua, Fudan, MITx, HarvardX and many other universities can be taken here for free.
NetEase open courses (2010) https://open.163.com/cuvocw/	NetEase	In november, 2010, NetEase launched “Open Course Project”, with the first batch of 1200 courses put on-line, including more than 200 videos with Chinese subtitles. People could freely access open courses from world-class overseas and domestic universities such as Harvard University. “This project is completely public welfare”.
NetEase cloud classroom (2012) https://study.163.com	NetEase	NetEase Cloud Classroom is an online platform for practical skills learning created by NetEase company, which is officially launched at the end of December 2012, which provides a large quantity of courses for learners, and the users can arrange their own study progress according to their own learning level.
CNMOOC(2015) https://www.cnmooc.org/home/index.mooc	Shanghai Jiaotong University	CNMOOC platform independently developed by Shanghai Jiaotong University 2014, was officially launched, providing large-scale Chinese online courses to the world. Now there are over 1000 free courses that are available around world.
MOOC China https://www.mooc.cn/	37s universities and open distance education public service system in China	MOOC China is a Chinese MOOC network that collects the world’s outstanding open online courses. Coursera, udemy, etc., as well as other MOOCS platforms from China, such as MOOC of China University, have collected 1696 online courses from the best universities in the world.

The OER paradigm was officially adopted during the 2012 World OER Congress (Paris Declaration), demonstrating the increasing worldwide interest towards open education movements emphatically. The OER vision was to provide educational resources that, unlike in traditional learning in universities/schools, would be free and open for everyone. Since then, several institutions have started providing open courses to learners, mostly in the form of Massive Open Online Courses (MOOCs).

2.2.2 Integrate MOOC content into online learning

The first **MOOCs** emerged from the OER movement, which was sparked by MIT OpenCourseWare project. The term MOOC was coined in 2008 by Dave Cormier of the University of Prince Edward Island in response to a course called Connectivism and Connective Knowledge (also known as CCK08). CCK08, which was led by George Siemens of Athabasca University and Stephen Downes of the National Research Council, consisted of 25 tuition-paying students in Extended Education at the University of Manitoba, as well as over 2200 online students from the general public who paid nothing. All course content was available through RSS feeds, and online students could participate through collaborative tools, including blog posts, threaded discussions in Moodle, and Second Life meetings. (Wiki, n.d.b)

Compared with the traditional courses, MOOCs have some intrinsic characteristics: large scale, openness, personalized learning formats for students, and instant record of learning behaviors and process. These features have significantly impact higher education during the campus closures period caused by COVID-19. Students' learning experiences and results are well enhanced by getting free access to over 41,000 courses on the MOOCs of Chinese Universities.

MOOCs have some components, e.g., videos, assignments, discussion forums, interactive sessions, additional resources, and others. MOOCs can be used as additional resources for the flipped classroom and blended learning, based on the analysis of learner characteristics, contents, and resources required in the learning. For example, a teacher can create a hybrid course that incorporates the MOOCs of other teachers. Hybrid course teachers can select and fix online components of the hybrid course from the



Term 6. MOOC

A massive open online course (MOOC) is an online course aimed at unlimited participation and open access via the web (Kaplan & Haenlein, 2016). In addition to traditional course materials, such as filmed lectures, readings, and problem sets, many MOOCs provide interactive courses with user forums or social media discussions to support community interactions among students, professors, and teaching assistants (TAs), as well as immediate feedback to quick quizzes and assignments. MOOCs are a recent and widely researched development in distance education. (Masson, 2014) MOOCs provide an affordable and flexible way to learn new skills and deliver quality educational experiences at scale.

MOOCs and others, and develop in-class components. This method can simplify the hybrid course design in some aspects. However, it may be a challenge to integrate the in-class components into the existing MOOC in a way that optimizes student participation, satisfaction, and final learning. (Bruff, Fisher, McEwen & Smith, 2013)

According to the online platform used by instructors, MOOC-based online learning is categorized into MOOC platform-led type and universities' own LMS-led. In the MOOC platform-led type, the task of instructors may be simply giving a link to MOOCs and reviewing the evidence for course completion on the platform. In the other case, instructors transfer useful materials that will be integrated into their learning activities design, from MOOCs platform to Universities' own LMS (such as Moodle, Canvas, Blackboard).

To integrate MOOC content or other high-quality online resources into one's teaching effectively, the instructor can follow some tips. (de Jong et al., 2019)

- Clearly define what content you want to include in your course.
- Determine the way you like to use online materials.
- Search for MOOCs on the selected topic.
- Determine the availability of the specific MOOC and its contents.
- Gauge the credibility of the MOOC before deciding to integrate.
- Ensure the MOOC content is freely available to your students.
- Determine if the MOOC contains the desired teaching modes.
- Determine the social-epistemological dimensions of the course.
- Make sure you align the goals, the teaching and learning activities, and the assessments.
- Provide clear instructions to students on how to enroll in the MOOC or access the MOOC content.
- Provide clear instructions to students on how to utilize the MOOC and its resources.
- Determine the success of MOOC integration.



Story 3. Self-directed learning supported by Coursera

In the online course “Powerful Teaching Tools: Web2.0 Tools” set up by Professor Bernard of the University of Houston, the Coursera platform is used to provide a large number of videos and reading materials. Students complete self-directed learning based on learning tasks and pass the weekly test and feedback in the form of submitting self-reports.

Getting Started

- ▶ 视频: Welcome to Powerful Tools for Teaching and Learning: Web 2.0 Tools 4 min 继续
- ▶ 视频: What is Web 2.0? 5 min
- ▶ 视频: An Analogy for Web 2.0 Tools 1 min
- ▶ 视频: Toolbox Story 6 min
- 📖 阅读材料: Syllabus and Grading Policy 10 min

Week 1: Communication

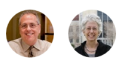


Figure 1. Online course “Powerful Teaching Tools: Web2.0 Tools”

Delivered via Coursera, the American online learning platform facilitates online learning of the course “Powerful tools for teaching and learning: Web 2.0 Tools”. This course lasts five weeks, with approximately half an hour of video lectures a week. It provides quizzes, weekly exercises, readings and discussion forums for students to conduct self-learning and self-assessment. The course is also provided on-demand, in which case learners can take their time in completing the course with all of the material available at once.

Source: <https://www.coursera.org/learn/teaching-learning-tools>

2.3 Flipped instruction with video clips

Flipped instruction has other similar terms, such as flipped learning, flipped classroom, and flipped classroom instruction.

According to the online Flipped Learning Network (<https://flippedlearning.org/>), **flipped learning** means using lecture videos as homework and using class time for more in-depth learning, such as discussions, projects, experiments, and providing individualized guidance for individual students. The basis for the model is that, the next day's lectures or lessons are recorded videos and presented to the students as homework on the night before. Students watch videos the night before class to prepare for the next class day's activities, which are directed by the instructor. (Sauer, 2016)

The “**flipped classroom**,” which means inverted classroom or reverse classroom, refers to an instructional approach that employs “interactive group learning activities inside the classroom, and direct computer-based individual instruction outside the classroom”. (Bishop & Verleger, 2013).

Flipped classroom instruction is a pedagogical strategy primarily used in higher education settings, which is becoming more and more dominant in high schools and middle schools (Tucker, 2012). Flip classrooms are also known as mixed models (Garrison & Kanuka, 2004) or mixed learning (Tucker, 2012), and flipped classrooms convert what would be considered didactical lectures or textbook instruction into how-to instructional tutorials via video or podcast.

In the beginning, the need for the flipped classroom was derived from the demands of students who were absent from the classes. In 2007, two chemistry instructors, Jonathan Bergmann and Aaron Sams, posted their own courseware and video lessons online for absent students who hope to make up for the missing courses, and the first prototype of the flipped classroom had arrived (Liu, Zhang & Fan, 2013). Since that time, they have completed research on this model as a way to deliver instruction all of the time, written books, and created an online learning network for teachers who need resources to flip their own classroom instruction.

As the demands on faculty time increase and the volume of



Term 7. Flipped instruction

Flipped instruction is a pedagogical strategy primarily to deliver lectures in the form of pre-recorded video clips before class and spend students' engagement in collaboration and interaction for in-depth learning

information for which students are responsible mounts up, the use of formal lecture-based content delivery may increase (Goldberg, Haase, Shoukas, & Schramm, 2006). This reduces the in-class opportunities for teachers to create a student-centered environment in their classrooms. In a flipped or inverted classroom, the teacher will “lecture” in the form of a pre-recorded video before the lesson and spend the classroom time to engage students in learning activities related to cooperation and interaction (Mok, 2014).

Through the increase of online instructional videos via YouTube, Curious, Khan Academy, Vimeo or even self-created instruction, educators are transitioning their instructional strategies to include flipped classroom methodologies. By doing so, instruction is provided outside the traditional four-wall classroom while application of material and assessments are conducted within the classroom in a more kinesthetic and interactive learning approach. (Mattis, 2015)

2.3.1 Benefits of flipped instruction

Comparing with traditional lectures which are associated with passive learning, flipped instruction is one way of active learning, which engage students in this process and draw them into the material by stimulating excitement and motivation. Research on the flipped classroom used by the University of Florida shows that 85% of students strongly agree that this is a good method. (Kim, Patrick, Srivastava, & Law, 2014)

The recent movement to integrate the flipped classroom model into higher education has led to major changes that have affected teaching practices in different ways. In 2019, the Association for Educational Communications and Technology published a review of 85 studies on flipping classrooms. The result from reviewing these studies showed how the flipped classroom model could be used in teaching and learning across university disciplines (Al-Samarraie, Shamsuddin, & Alzahrani, 2019). The distribution of these 85 studies is mainly in the following seven subjects: medicine and health sciences (23.5%), natural sciences (20%), social sciences and humanities (20%), engineering and technology (16.2%), mathematics (9.4%) education level (8.2%), and art (3.5%).

Flipped instruction is strongly popular among the students, mainly because the learning process stimulates self-engagement and interaction. As a good and effective approach, flipping teaching can reduce mental effort and cognitive input, to obtain better learning results, and better achieve teaching goals and/or speed up learning. Another advantage of flipped teaching includes the promotion of distance learning to ease the traditional classroom environment in the economic constraints, which leads to a reduction in class size and a low teacher-student ratio (Berrett 2012).

Flipped instruction can provide teachers and students with many advantages. For example, the use of active learning strategies in the class time can enable teachers to understand students’ learning styles and difficulties better, use class time more effectively and creatively, and customize courses and provide personalized teacher-student guidance and peer collab-

oration meeting the learning needs of different student groups (Roehl, Reddy and Shannon, 2013). Moreover, students also responded positively to flipped instruction. Studies have shown that this method is more attractive to students than traditional university lectures (Nouri, 2016). And it can stimulate students' more positive attitudes towards learning (Jeong, González-Gómez, & Cañada- Cañada, 2016).

Flipped instruction has changed traditional classroom dynamics. To support students to the greatest extent, effective way is to let students watch instructional videos for homework, and use class time to solve their problems and have a real and lively discussion.

2.3.2 Designing the flipped instruction

Confronted with the accidental COVID-19 outbreak, most of the teachers and administrators have no preparation for online learning, especially the teachers giving practice-oriented courses.

Flipping instruction refers to making full use of the model stage, as shown in Figure 1, to provide students with video/digital media courses before the class to expose them to learning materials for the first time. Besides, students who participate in the flipped instruction must have the opportunity to complete assignments/quizzes before or at the beginning of the class. Finally, teachers must provide answers to students' questions through class time teaching, and allow them to practice collaboratively and apply the learning materials received before the class to practice (Al-Samarraie et al., 2019). In the period of campus closure, the in-class interaction and discussion can be conducted online with some interactive software or webcasts.

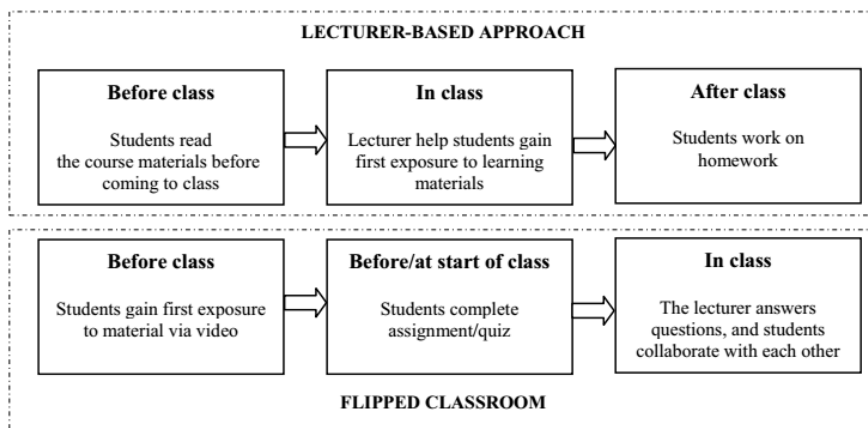


Figure 2. A comparison between the traditional and flipped classrooms

The University of Florida (UF) Electrical Engineering Bachelor's degree curriculum (spring 2013 course) was taught in "Flipped Classroom". Students need to watch the lecture online in advance and prepare to solve problems in the group. These lectures are the same as those used in the Fall 2012 course, which have been recorded and posted online. Unlike large lectures, nine groups discuss three times a week. The group can recruit up to 20 students. These students were expected to solve the example problem together. These are similar to the problems assigned to homework last semester. The homework questions for the fall of 2012 and the class questions for the spring of 2013 are similar to each other and similar to the exam. The laboratory in the spring of 2013 was consistent with the laboratory in the autumn of 2012 to focus more time on solving the guiding problem, which the author believes is crucial to the success of the students. (Kim, Patrick, Srivastava, & Law, 2014)

2.3.3 Organizing the flipped instruction

Based on the class design, there are a lot of things needed for organizing the flipped instruction.

In the University of Florida (UF) Electrical Engineering Bachelor's degree curriculum (the Spring 2013 course), the flipped instruction was shown as follows. (Kim et al., 2014)

- The lectures had been recorded and posted online.
- Students were expected to watch the lectures online in advance and come to class prepared to work problems in small groups.
- Instead of one large lecture section, nine thrice-weekly recitation sections were offered, with a maximum enrollment of 20 students, who were broken into groups of four and expected to work together on sample problems.
- These were similar problems assigned as homework and exam problems as in the traditional lectures.
- The in-class time could focus more time on guided problem solving, because anecdotally the authors had come to believe that this was critical to students' success.
- This course also had weekly quizzes, three exams, and a final, with a similar schedule to the traditional lectures.
- To encourage students to watch the lectures, each lesson begins with 5-minute concept-oriented quizzes, which are relatively simple.
- The assessment methodology was different from the traditional lectures, in which the results observed from the small group problem sessions.

- Course sizes were similar to traditional lectures.
- The effectiveness of these methods was assessed and evaluated in terms of student attitude, retention, and performance (Kim, Patrick, Srivastava, & Law, 2014).
- For millennial learners, engagement (Roehl, Reddy, and Shannon, 2013) is more important than ever. They believe that millennials are more intolerant of traditional lecture-style teaching methods than other generations (Vaughan, 2014).

In the flipped classroom, various pedagogical tools and methods have been developed and adopted.



Tip 5. What are the pedagogical tools and methods used in the flipped instruction?

Here are the pedagogical tools and methods:

- Provide interactive software or Web-based materials in class.
- Complete online delivery of content.
- Employ problem-based learning.
- Social interaction occurring between students and their teachers are the key ingredient to the program's success.

Source:

- ① Kim, G.J., Patrick, E.E., Srivastava, R., Law, M.E. (2014) *Perspective on Flipping Circuits, IEEE Transactions on education*, vol 57 (3): 188-192.
- ② Beichner, R., Resnick, M., Young, J., & Paine, S. (2011). *Technology and the Human Connection*. New York, NY, USA: McGraw-Hill.

Flipped teaching is a response to the idea that classroom time can be used to enable students to participate in learning through active learning techniques rather than through individual lectures. This more student-centered learning strategy has replaced traditional lectures. This learning strategy includes active learning, discussion, problem-based learning, and other forms of group work and peer guidance. The distribution of the learning content was moved out of the classroom and changed to video or reading before class.

There is no fixed formula for flipping a class, because the amount of flipping varies by course and class. Here is the case recently-used with flipped instruction in Shanghai.



Story 4. Confronted with COVID-19 outbreak, “Flipped Classroom” meeting online teaching is the way-out for teachers and students in Shanghai

PS: the flipped classroom, in this case, refers to the flipped instruction discussed in this section.

The School of Information Science and Technology, ShanghaiTech University carried out “Flipped Classroom”

On March 2, 2020, the School of Information Science and Technology, ShanghaiTech University offered 25 undergraduate courses and 20 graduate courses using the Flipped Classroom model. It combines offline course recording with real-time online interaction. The courses adopt the teaching modes, which include self-study before class, question and answer in class, and simulation training after class. Through this novel teaching mode, students are stimulated to learn independently and think deeply, and this mode cultivates their innovative and diversified ways of thinking and learning habits to further achieve a more in-depth and true learning outcome.

“Flipped Classroom” is an education model that many universities are practicing. Students watch teaching videos and read teaching materials before class to complete the “big class,” which is theoretical knowledge learning. In “small class,” teachers help students digest and understand the theoretical knowledge by organizing a large number of classroom activities, achieving the goal of guiding practice by theory. Therefore, this is a student-led-classroom class, and the class is full of teacher-student interaction.

The course “Instant Location and Map Construction” introduces the technologies and algorithms required to enable smart mobile devices to track their own location in a given environment. Professor Laurent Knip said that this sudden change in online teaching had brought new challenges and pressures to both teachers and students, but we must also see the advantages of online teaching. Laurent Knip believes that “students can adjust the teaching rhythm by replaying and pausing. And I also have the opportunity to stop to listen to the video I recorded, and make further adjustments according to the video effect, and work hard to make students have a better listening experience.”

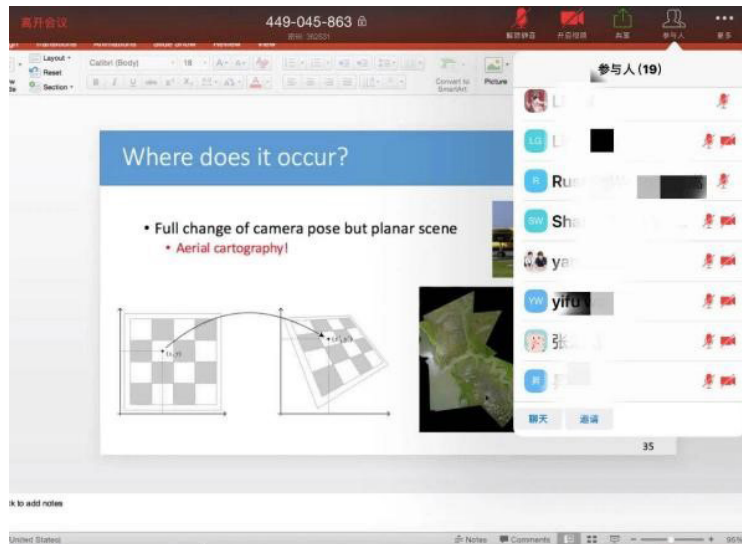


Figure 3. Online Teaching of “Instant Location and Map Construction”

2017 graduate student Huang Shuai learned the content of the course in advance through the video recorded by the teacher; in the online course, he followed the professor to solve the key and difficult parts. “When Professor Laurent draws on a shared screen, I feel like sitting in front of a blackboard. The recorded videos, online courses, and notes greatly facilitate our review process after class.” Huang Shuai said, “Learning in the classroom, it is difficult for shy students to ask questions out loud, especially when sitting behind the classroom. Now, we can easily communicate online, it feels like having a private tutor.”

In order to better assist and cooperate with teachers to carry out teaching activities, the School of Information Science and Technology also added teaching counselors during this special period. The teaching counselor will assist the professors to record the course in advance, record the attendance rate of the students and the student's interaction with the class. After the class, the teaching counselor and the instructor hold a meeting to discuss the development and recording of the follow-up courses. The recorded online explanations and Q&A were also shared with the students so that they could watch it repeatedly.

The School of Information Science and Technology, ShanghaiTech University has carried out “Flipped Classroom” for more than a month. Teachers continue to polish the course before the class in order to find problems early, and then improve and ensure that the formal online teaching goes smoothly. Through continuous communication and adjustment in the early stage, students have gradually adapted to the new teaching model, which is “self-study—reflection—interaction—feedback.”

Source: <https://baijiahao.baidu.com/s?id=1663094982017853063&wfr=spider&for=pc>

2.4 Group learning

Group learning has many different names (for example, group work, cooperative learning, group learning, peer coaching, etc.) (Faculty Innovation Center of the University of Texas at Austin, 2019). It has different forms at different levels, from two students solving a simple problem to a team completing a comprehensive project. According to the different types of questions or problems, group learning can be related to project-based learning, inquiry-based learning, problem-based learning, and so on. To make group learning more effective, students need to practice team-building skills and learn to be responsible for themselves and the group.

2.4.1 Encouraging cooperative learning

Cooperative learning includes a wide range of strategies to promote academic learning through peer cooperation and communication. Students should help each other learn, share ideas and resources, and jointly plan learning content and methods. Teachers allow students to choose the content and objectives of learning activities while not giving specific instructions, to activate students to participate actively in the process of acquiring knowledge. (Davidson & Major, 2014, as cited in Huang et al., 2020a)

There are five essential elements to mediate the effectiveness of cooperative learning, and they are known as PIGS Face: **p**ositive interdependence, **f**ace-to-face interaction, **i**ndividual and group accountability, **s**ocial skills, and **g**roup processing(wiki, n.d.a)

Before building a group, how a group develops should be understood. A structured process of effective group development is essential for constructing a group. Tuckman (1965, as cited in Huang et al., 2019), Tuckman and Jensen (1977, as cited in Huang et al., 2019) summarized that group development process regards five stages: forming, storming, norming, performing, and adjourning(Huang et al., 2019)

- **Forming:** Students come together for the same learning goals, and they need to know about the characteristics and differences of each other. At this stage, they should become



Term 8. Cooperative learning

Cooperative learning is the instructional use of small groups so that students work together to maximize their own and each other's learning. In cooperative learning situations, there is a positive interdependence among students' goal attainments; students perceive that they can reach their learning goals if and only if the other students in the learning group also reach their goals. Cooperative efforts result in participants striving for mutual benefit so that all group members benefit from each other's efforts, recognizing that all group members share a common fate, realizing that one's performance is mutually caused by oneself and one's colleagues, and feeling proud and jointly celebrating when a group member is recognized for achievement. (Johnson, & Johnson, 2017)



Tip 6. Skills for an effective group process

For students, they need to know how to manage the process so that they can effectively accomplish their tasks. Students can perform more productively and effectively if they acquire these skills.

- **Individual responsibility and accountability:** Everyone in the group should agree on what needs to be done and who should be responsible for a particular part. Then each group member is clear about what his/her specific job is and takes responsibility to accomplish the task.
- **Constructive Feedback:** Group members should give and receive feedback about group ideas. Constructive feedback requires students to focus on group thoughts and behaviours positively and offering his/her own recommendations for better improvement. Giving feedback requires group members to listen carefully, ask questions, and be open to change others' ideas.
- **Problem solving:** Group members help each other to utilize strategies to approach their goals, so that they can facilitate group decision making effectively and avoid conflict. Besides, they know when to ask the professor for advice and help.
- **Management and organization:** Group members should know the strategies to make plans, to manage their time and activity, and to hold discussions. For example, they make sure that the group schedule is created and followed, and that everyone has an opportunity to participate and give their voice.
- **Knowledge of roles:** There are different roles in a group (e.g., facilitator, idea-generator, summarizer, evaluator, mediator, encourager, recorder). Group members should also be aware of which one they are suitable for. They are also willing to exchange their roles to maximize the learning experiences of the group members.

Source: Centre for Teaching Excellence, University of Waterloo, <https://uwaterloo.ca/centre-for-teaching-excellence/teaching-resources/teaching-tips/tips-students/being-part-team/teamwork-skills-being-effective-group-member>

familiar with each other and their tasks. Besides, discussing the content of the task, formulating the methods to deal with the problem, and establishing the rules of participation are also important.

- **Storming:** When the group attempts to accomplish a task or to achieve a goal, conflicts about responsibility, division, or disagreement on the rules may appear. So at this stage, they should be open to others, giving explanations, testing ideas, and so on to find the solutions.

- **Norming:** When the group settles a conflict and gains harmony, the members become more positively engaged. They are more willing to share information, communicating, and solving new problems. So clarification of interaction processes and taking actions to address issues are essential at this stage.
- **Performing:** Reaching this stage, members are genuinely interdependent, and the group has developed a real unity. They collaborate smoothly and play their own roles according to the group's actual needs. The main thing at this stage is solving problems in the best way to approach the improvement of the group.
- **Adjourning:** At last, a group can be terminated when the task is over or for other reasons. The important thing at this stage is the conclusion, recognizing member's achievements and contributions.

Group development is not always linear. The group process can loop back to the former stage when there are unsolved conflicts, new members' joining, or other difficulties in understanding. Rules of engagement established in the early stages will help later stages when they meet new problems.

Cooperative learning groups are classified into different types according to their purposes. Within **formal cooperative learning**, students work together from one class to several weeks to achieve common goals and complete particular learning tasks, while students at **informal cooperative learning** work together in temporary groups lasting within one class period. **Cooperative base groups** have a long term learning collaboration with responsibilities to provide support, assistance, and encouragement for each other to develop. (Johnson, Johnson, & Holubec, 2008, as cited in Johnson, & Johnson, 2013)

There are four components in cooperative learning activity: teacher-student interaction, student-student interaction, task specialization and materials, and role expectations and responsibilities. We can implement five steps to establish a task structure for a cooperative learning activity (Borich, 2014).

- **Specify the goal.** Your job is to identify the outcome of the activity for students and check for their understanding of the activity.
- **Structure the task.** Cooperative learning activity allows the division of labor, role responsibilities, collaborative efforts, and end products that promote students' critical thinking. Four characteristics may help positive interdependence, individual accountability, equal participation, and simultaneous interaction.
- **Instruct and evaluate the process.** Teachers ought to identify collaborative behaviours to instruct students in the process. Students need to exchange thoughts, ideas, and feelings with each other comfortably and efficiently.
- **Monitor group performance.** You can take several actions to facilitate students

during the process, such as guiding the access to information, repeating the timeline, exhibiting the product model, etc. The purpose of your monitoring activity is to extract a group from a blind alley and to provide emotional support and encouragement to get the final success.

- **Debrief.** Group members could rate each other’s collaborative performance and obtain their group averages during debriefing to identify their strengths and deficiencies.

Social interaction is important to an effective learning process. Online group learning can provide an ideal environment in which interactions among students play a central role in the learning process. But when teachers try to introduce online group learning into their courses, they may face some problems. There are seven of the most common problems and the appropriate solutions for each. (Roberts & McInnerney, 2007)

Table 3. Seven of the most common problems and some appropriate solutions for online group learning

Problems	Appropriate solutions
Student antipathy towards group work	<ul style="list-style-type: none"> • Tell the students the benefits! • Make the assessment criteria explicit.
The selection of the groups	<ul style="list-style-type: none"> • Select at random. • Deliberately select heterogeneous groups.
A lack of essential group-work skills	<ul style="list-style-type: none"> • Introduce new courses. • Cover the skills required at the beginning of the course.
The free-rider	<ul style="list-style-type: none"> • Use pressure from the instructor. • Use peer pressure openly and unashamedly. • Employ a marking scheme that penalizes free-riders
Possible inequalities of student abilities	<ul style="list-style-type: none"> • Identify potential “suckers” in advance. • Employ an appropriate reward scheme. • Use subgroups within groups where feasible
The withdrawal of group members, and	<ul style="list-style-type: none"> • Take no action. • Use a multiplier on the group work. • Use a multiplier on the remaining course work.
The assessment of individuals within the groups	<ul style="list-style-type: none"> • Use individual assessment. • Assess individual contributions. • Use self, peer, and group assessment techniques.

2.4.2 Promoting project-based learning

Like Cooperative learning, **project-based learning** is also a form of group learning. Project-Based Learning (PBL) is a teaching method in which students learn by actively engaging in real-world and personally meaningful projects. Students will design, develop, and construct real solutions to a problem, which can be seen as learning by doing. The focus of project-based learning is on promoting students' ability to develop creative, realistic, tangible solutions to sometimes difficult problems through teamwork (Project-Based Learning, 2020). It will facilitate students to transfer their knowledge and skills to a real-world situation.

Within the framework of project-based learning, students seek solutions to problems by asking and refining questions, debating ideas, making predictions, designing plans and/or experiments, collecting and analysing data, drawing conclusions, communicating their ideas and discoveries to others, raising new questions, and creating artifacts (Blumenfeld et al., 1991). They are guided by what they think the result of their project should be. The teacher coaches the team to keep students on task and keep their work productive while students develop self-management and collaboration skills. By providing peer feedback on the content and demonstrating respect for their own findings, more substantive content is learned. The end product of each team is often presented to the whole class, demonstrating their understanding of what they learned. (Huang et al., 2019)

Depending on the goals of the instructor, structured or unstructured projects can be chosen, the period and size of the project can vary greatly. The implementation of project-based learning belongs to a constructive approach, which involves four key phrases: (Project-Based Learning: Teaching Guide, 2020)

- **Defining the problem.** Firstly, students should ask questions about the problem. They need to define the problem in terms of given contexts and identify the nature and scope of the problem.
- **Generating ideas.** To solve the given problem, students should generate multiple ideas by brainstorming and discussions. One or more solutions should be proposed.
- **Prototyping solutions.** Once potential solutions to the



Term 9. Project-based learning

Project-based learning takes place in the context of authentic problems, continues over time, and brings in knowledge from many subjects. Project-based learning, if properly implemented and supported, helps students develop 21st century skills including creativity, collaboration, and leadership and engages them in complex, real-world challenges that help them meet expectations for critical thinking. (U.S. DEPARTMENT OF EDUCATION, 2017)

problem are decided, students need to design and prototype solutions with products or services. Students should design, construct, and deliver the prototype in a rapid iteration.

- **Testing.** When the prototype is completed, the students should present it to the audience to show how well their products or services will work in a “live” or authentic setting. Feedback would be given to the students, and they will generate new questions to answer.

To help teachers do PBL well, PBLWorks (<https://www.pblworks.org/>) promotes a research-based model for “Gold Standard PBL,” it has three parts: (a) Student Learning Goals, (b) Essential Project Design Elements, and (c) Project Based Teaching Practices. (Larmer, 2015)



Story 5. “Sample Project” from Yale University

At Yale, “Sample Project” is offered every year, Projects will differ year to year, class to class, and professor to professor; they are also attempting to implement more STEM related projects in following years. For example, Professor. Jonathan Kreiss-Tomkins launched “An Evaluation of Liberty Community Services Eviction Prevention Program.” For Intersectionality and Women’s Health, in the spring of 2012, Professor. Drew Marconi and Marlene Tempchin launched “Achieving Accurate Representation of English Language Learners in Magnet Schools: Feasibility and Recommendations.” For Public Schools and Policy at the same time.



Source: <https://cbl.sites.yale.edu/about-us/sample-projects>

2.5 Joint online course

Teachers in different universities may have different advantages and disadvantages about some courses, and the joint online courses could be planned to meet the demands of each university, normally through collaboratively teaching by teachers from different universities and students attending the lectures online with supervising by local teachers.

The form of two or more teachers lecturing together, which is called **co-teaching**, could be traced back to the 1960s in US.

In co-teaching, the collaborative teachers must establish trust for each other, form periodically communication channels, share the chores, celebrate, work together creatively to overcome the inevitable challenges and problems, and anticipate conflict and handle it constructively. In the university closure, technology is utilized to enhance co-teaching, and the joint online course could be implemented by integrating two-way telecommunication tools into the theory of co-teaching. The following principles from the book of *A guide to co-teaching: New Lessons and Strategies to Facilitate Student Learning*, could be considered when university teachers open a joint online course. (Villa et al., 2013)

- Coordinating teacher's work to fulfil at least one common, publicly agreed-on goal.
- Sharing a belief system that each of the team members for the joint course has the unique and needed expertise.
- Demonstrating parity through playing the dual roles of expert and novice, teacher and learner, giver and recipient of knowledge or skills alternatively.
- Using the distributed functions theory of leadership, remembering that the task and relationship functions of the traditional lone teacher will be distributed among all co-teaching group members in a joint course.
- Utilizing a cooperative process that includes positive interdependence, face-to-face interaction, performance, as well as monitoring and processing of interpersonal skills, and individual accountability.



Term 10. Co-teaching

Co-teaching is two or more people sharing responsibility for teaching some or all of the students assigned to a classroom. It involves the distribution of responsibility among people for planning, instruction, and evaluation for a classroom of students (Villa, Thousand, & Nevin, 2013).

Some functions or responsibilities occur before, during, and after each lesson; collaborative teachers should decide how they will divide up these jobs from one lesson to the other. Some responsibilities will occur daily; others may take weekly or periodically; and still others may take once or twice a year. Teachers should decide how the content will be presented—for example, one person may give lectures, and the other(s) facilitate the follow-up activities.

After the preparation, the instruction delivery method should be decided, like live video, learning by MOOCs, flipped learning, etc. Also, grouping students should be decided, students from different universities could form new groups according to the principle of homogeneity between groups and heterogeneous in the group, or grouping by universities.



Story 6. “Database System and Application” online collaborative teaching during COVID-19 outbreak--Northwest Normal University

A group of teachers, in the course of the “Database System and Application” , the School of Computer Science and Engineering of Northwest Normal University, launched online collaborative teaching in the face of the new model, new subject, and new challenge of online teaching in the current epidemic. The group of teachers conducted many in-depth discussions and practical explorations on teaching team organization, teaching content arrangement, teaching activity organization, teaching method selection, online tool selection, and teaching concept transformation.

This group of teachers divided the teaching according to their own specialties and carried out comments and supervision within the group to ensure the quality of the courses. They also formed a working mechanism for weekly discussion, class analysis, chapter summary, and regular weekly meeting. It breaks the teaching mode of full teaching, divides the teaching process into knowledge guidance, assignment, self-study, homework completion, cross-talk summary, and difficulty analysis. They constructed a multi-agent comprehensive learning seminar hall of N (teacher) + M (student) under the network environment, forming a teaching mode of many-to-many classes, one-to-many small class discussions, and one-to-one online question answering. The practice transforms the teaching concept, cultivates students’ independent learning ability, integrates new teaching tools in the teaching process, such as Yangtze River and classroom, WeChat conference, Moodle platform, MOOC resources, etc., to optimize the online teaching process.

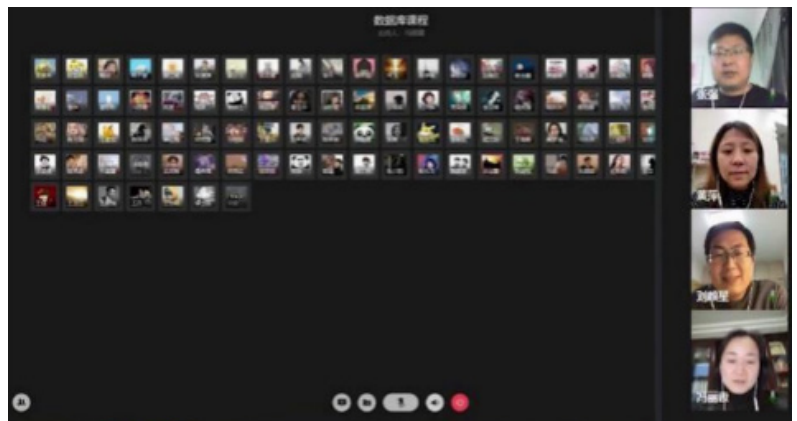


Figure 4. Northwest Normal University "Database System and Application" online collaborative teaching

Source: <https://mp.weixin.qq.com/s/BKKGjixEPZM-4HY6T0M:kw>

3 Preparing Materials and Tools for Learning and Teaching

Learning materials and tools are the two basic elements for an instructional system, except for teachers and learners. Lots of free digital learning resources and tools are available for use, and it is important to select the appropriate ones for our lesson. The criteria for selecting digital learning resources are elaborated, and different kinds of digital tools for teaching and knowledge construction are discussed in the following part.

3.1 Using digital resources as learning materials

With the development of ICT in education, digital learning resources (DLR) within higher education include not only various types of multimedia materials but also well-designed course activities such as Massive Open Online Courses (MOOCs), Small Private Online Courses (SPOCs), or online video micro-courses. These DLR are making learning more accessible, engaging, and contextualized. However, we have to consider how to choose suitable **digital learning resources** for learners while they are doing online learning activities.



Term 11. Digital Learning Resource

Digital Learning Resource refers to materials included in the context of a course that supports the learner's achievement of the described learning goals. These materials consist of a wide variety of digitally formatted resources, including graphic images or photos, audio, and video, simulations, animations, prepared or programmed learning modules. (Epigeum, 2019).

3.1.1 The availability of Digital Learning Resources for Higher Education

Over the years, many digital learning resources have been created, including courses, policies, toolkits, as well as guidelines on online learning. During the campus closures, these resources could assist with student learning. Table 4 presents a comprehensive review of available digital learning resources that both teachers and learners can refer to in their context.

Table 4. Classification of Digital Learning Resources

Resources \ Objects	Higher education	Adult education
National public platform for educational resources	iCourse, FUN, IGNOU, Open Educational Resources	Xuexi.cn
Public platforms for educational resources of regions	University Open Online Courses (UOOC), Zhejiang Institutions of Higher Learning Online Open Course Sharing Platform	The Civil Learning Space in Capital Library of China
School-based resources at all levels	XuetangX, CHINESE MOOCS, Blackboard, JMOOC, Ewant, Commonwealth of Learning (COL)	The Open University of China, “SOU Course” FM in Shanghai Open University
All types of resources by online educational enterprises or school-enterprises collaboration	Zhihuishu, ulearning, NetEase Online Open Courses, eryl.mooc, chaoxing.com	Udacity, NetEase Cloud Classroom, Zhengbao Cloud Classroom
International high-quality open educational resources (OER)	Coursera, edX, Canvas, FutureLearn	ALISON, iversity, Open2Study, openupEd, CodeCademy

Open Educational Resources (OER) are freely accessible, openly licensed text, media, and other digital resources that are useful for teaching, learning, evaluation, and research (Open educational resources, 2020). In the face of the COVID-19 pandemic, the value and necessity of Open Solutions are crucial. Open Access to scientific information and open data facilitates better and faster research towards a vaccine and inform public health measures essential to contain the spread of the virus. OER keep citizens updated and educated about the virus, helping to ensure their compliance with public health advisories and allow learning to continue at a distance.

OER is expanding in scope and availability. One current problem with this growth is that there is no complete list of all OER (nor is there likely to be one, given the rapid expansion of online content). To find appropriate OER, searchers will need to adopt several search strategies.



Term 12. Open Educational Resources (OER)

Open Educational Resources (OER) are learning, teaching and research materials in any format and medium that reside in the public domain or are under copyright that have been released under an open license, that permit no-cost access, re-use, re-purpose, adaptation and redistribution by others. (UNESCO, 2019)



Tip 7. Some search strategies to find appropriate OERs (Huang et al., 2020c)

- **Use operators, such as “OER +” and “OER &” to include two or more terms:** For instance, if teachers or learners want to search for technologies used with OER, it is possible to explore in this way: OER + technology.
- **Use the minus sign to eliminate results containing certain words, such as “OER -”:** If the teacher wants to exclude results that contain specific terms, he/she can use the minus sign, for instance: OER – open data.
- **Use an asterisk within quotes to specify unknown or variable words, such as “OER is *”:** This is helpful if the teachers or learners are searching, for instance, for a specific definition, but they could not make out the entire phrase (e.g., “OER is a public resource that *”).
- **Use quotes to search for an exact phrase, such as “OER is defined”:** Searching a phrase in quotes will provide only pages with the same words in the same order as the way it is written in the quotes. This trick is important especially if they trying to find relevant results containing a specific phrase.

3.1.2 The criteria for selecting digital learning resources

Ozdemir and Bonk (2017) have pointed out that searching and locating specifically high-quality educational resources, among the thousands that are published, is a difficult task. Therefore, teachers should carefully choose the quality of educational resources to use by referring to well-known national and international repositories. Additionally, assessing and selecting good quality DLR is one of the challenging tasks. Especially, DLR can be chosen on several criteria, as follows: (Huang et al., 2020b)

- **Licensing:** Educators should choose the learning resources with open license or the approved agreement from the creators/publishers, as this will allow them to reuse and remix these DLR in their teaching context legally.
- **Accuracy/quality of content:** several DLR are published online without knowing the reliability of the contents or the publishers. Therefore, educators should refer to reliable DLR and platforms (please see the next section for further information).
- **Interactivity:** Educators should choose DLR with more interactive elements, which can help increase the learning engagement and motivation of students. For instance, using interactive open textbooks, instead of simple document files (i.e., PDF), will make students more active and interested in learning.
- **Adaptability:** Educators should choose the DLR, which are easy to adapt in their context, i.e., resources which can be easily mixed or modified to fit a specific learning context. For example, PPT presentations can be excellent resources as they can be easily readapted.
- **Cultural relevance & sensitivity:** Educators should choose the DLR that do not convey any offensive information for any given race or culture.
- **Suitable learning resources also include the following five criteria:** (a) **Suitability of content:** the DLR should be closely related to learning objectives and contents, as well as be interesting or necessary to solve problems for students; (b) **Suitability of difficulty:** the contents should be moderate in difficulty and scale, so that students will avoid cognitive overload; (c) **Suitability of structure:** the structure of learning contents is concise and rational, which will not make students “confused”; (d) **Suitability of the media:** the media should be presented acceptably, so as not to cause visual fatigue, especially for younger students; and, (e) **Suitability of resource organization:** different types of learning resources can be organized, such as text, video, animation, virtual experiments, etc., in order to make the layout clear and the content suitable, and students will not be confused.

Although the teachers or the universities have chosen quality digital learning resources, the learners shall have the capacity for their own learning on the campus. The learners should have the opportunity to develop a sense of **agency in their learning** and believe that they have the ability to succeed in the face of campus challenges through their own efforts and abilities. For example, they shall be able to find the available digital learning resources or use the appropriate tools for their learning.



Term 13. Agency in learning

Learners with agency can “intentionally make things happen by their actions,” and “agency enables people to play a part in their self-development, adaptation, and self-renewal with changing times.” (Bandura, 2001) To build this capacity, learners should have the opportunity to make meaningful choices about their learning, and they need practice at doing so effectively. Learners who successfully develop this ability lay the foundation for lifelong, self-directed learning (US Department of Education, 2017).

3.2 Adopting digital tools for learning and teaching

Effectively selecting and using learning tools is beneficial for learners to find and process information, construct knowledge, collaborate with peers, express understanding, and evaluate learning effects in specific ways.

The convenience of tools should be taken into consideration when choosing learning scenarios. Specifically, tools should be convenient and quick to (a) help teachers effectively produce and manage resources, release notices and manage students; (b) help students obtain resources, participate in learning activities; (c) help teachers and students interact in real time; and, (d) help teachers, parents and schools understand students’ learning performance and make timely school-home interaction. (Huang et al., 2020b)

In the following sections, we will introduce the teachers and students with four common uses of digital tools for their teaching and learning: live class tools, instant messaging tools, and social networking, concept-mapping and mind-mapping tools, and collaborative authoring tools. Although there may be more digital tools, we hope these sections could provide some useful suggestions for teachers and students to create good materials or to make online teaching and learning effectively.

3.2.1 Live Classes Tools

According to the size of students, the current mainstream tools or platforms with complete teaching attributes can be roughly divided into two categories. One type is the platforms for large-scale live classes, which are suitable for large numbers of students. During the past two months of campus closures in China, the popular tools or platforms used are Tencent meetings (free support for epidemic situations, up to 300 people), Ali Nailing Future Campus (supports 102 people for free during the epidemic period, and can apply for a maximum of 302 people), Rain Class, etc. The other types refer to tools suitable for live lessons for smaller groups, mainly including ClassIn, Zoom, etc. Of course, the first type of tools can also do small class discussions, and the second type of tools can broadcast live on a large scale. Most of the tools or platforms provided in China are free to use. These tools are also currently supplying or working hard to add interactive teaching tools such as interactive whiteboards, clickers, and rush-responders. For the other tools or platforms from the world, many of them are suitable for hosting and streaming online lectures, such as Dacast (<https://www.dacast.com/>), IBM Cloud Video (<https://video.ibm.com/>), Vimeo (<https://vimeo.com/vimeolivestream>), and Panoto (<https://www.panopto.com/>). However, the use of these tools requires the purchase of a license to use them according to the number of users online.

For this type of live classes, teachers and students can carry out real-time teaching and learning at the same time and in different places through live education streaming platforms or popular social tools.



Story 7. Tsinghua University in China broadcast Live through TikTok

From February 5th to February 12th 2020, Tsinghua University in China broadcasted live through TikTok ten public courses covering international relations, public expression, traditional culture, and other fields. As key speakers, Xuetong Yan, director, professor and doctoral tutor of the Department of International Relations of Tsinghua University, Liu Dan, clinical supervisor of the Psychological Counseling Center of Tsinghua University, Gaoxi Xing, teacher of the Art Education Center of Tsinghua University, and Huining Liu, teacher of Tsinghua University gave lectures. When this series of courses had just run only three days, the total number of viewers reached 12.21 million, which is equivalent to 581 Tsinghua University classrooms full of students.

Source: https://www.sohu.com/a/373211898_120154665

3.2.2 Instant messaging tools and social networking

Instant messaging tools have the potential not only to attract learners, but also to provide motivation and support for online teaching and learning. Students must be more involved in the learning process. Connecting and communicating with their peers and teachers through communication technology is essential to support the learning process, knowledge acquisition and skills taught online. Students are accustomed to using technology to communicate, so they may be able to participate in a technology-driven environment more likely and more comfortably. Both synchronous and asynchronous communication can help to increase students' active participation in online courses.

Educators need to identify and understand how to use these communication tools to support online learning for students. Some commonly used communication tools include Blackboard Collaborate, Skype, Google Hangout, Today's Meet, Join.Me, WeChat, QQ, and DingTalk. These tools can promote communication and collaboration in online learning environments. (Communication Technologies: Promoting Active Online Learners, 2020)

Social networking has become a popular living way in our daily lives. It brings changes in the way we communicate with each other. Social networking refers to the use of social media websites and apps, such as Facebook, Instagram, and Twitter, to connect with family, friends, and people with common interests. By teaching through social networks, we can not only help students collaborate, but also teach them how to research.

3.2.3 Concept-Mapping and Mind-Mapping tools

Concept-mapping and Mind-Mapping tools are used to create diagrams of relationships between concepts, ideas, or other pieces of information.

Concept maps are graphical tools for organizing and representing knowledge in an organized way (Learn About Concept Maps, 2020). They include concepts that are usually encapsulated in some type of circle or box, and the relationship between concepts or propositions (represented by joining lines and linking words). Linking words represent the relationship between the two concepts. Words in the

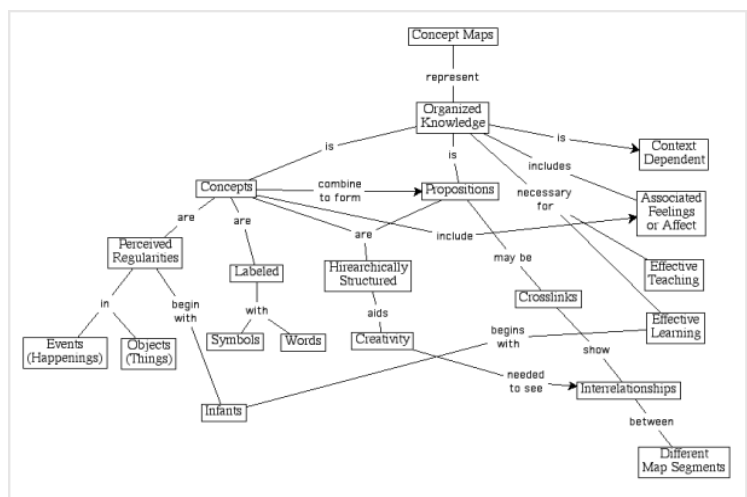


Figure 5. A concept map about concept mapping

Source: <https://msu.edu/~luckielctools/>

circle or box are used as labels for most concepts. (“Concept Maps: What the heck is this?” 2020). There are some most commonly used concept-mapping tools: Cmap, Visual Understanding Environment, CompendiumLD, BrainSharper, and so on. Figure 2 shows an example of a concept map, which describes the structure of concept maps and illustrates the above features.

Mind mapping is an efficient way to transfer information into and out of the brain. Mind maps have a natural organizational structure. The structure radiates from the center of the map, uses simple and brain-friendly concepts, and uses lines, symbols, keywords, colors, and images. Mind maps can convert information into colorful, memorable, and well-organized charts. Mind mapping can be used as a creative and logical means of taking notes.

Here are some popular mind-mapping tools, such as Mindmeister (<https://www.mindmeister.com>), XMind(<https://www.xmind.net>), Freemind (<http://freemind.sourceforge.net/>), MindApp(<https://www.mindapp.com>), MindManager(<https://www.mindjet.com/mindmanager/>) .

Figure 3 shows a mid mapping of a survey plan about online teaching in universities during educational closures.

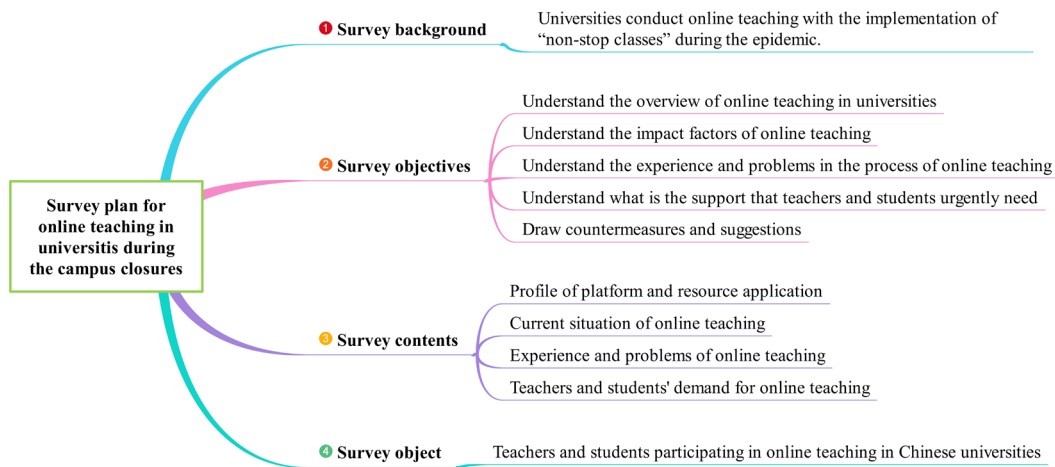


Figure 6. An example of mind map which represents a survey of online teaching in universities during educational disruption

Thinking maps can help us better organize our ideas. There are eight types of Thinking Maps: (Schwab et al. 2016)

- **Circle Map:** the purpose of the circle map is to use the information we already know to brainstorm.
- **Tree Map:** the tree map can be useful when information needs to be classified and organized. In appearance, a tree map resembles a real tree.

- **Bubble Map:** the purpose of a bubble map is to use specific adjectives and phrases to define the main theme.
- **Double Bubble Map:** a double bubble map is a combination of two bubble maps, often called a Venn diagram. It is used to compare the similarities and differences between the two topics.
- **Flow Map:** a flow map is similar to a flowchart. A flow map is an intuitive representation of a process, progress, or set of instructions.
- **Multi-flow Map:** the multi-flow map can help identify the causes and effects of certain events. The map will start with the main event.
- **Brace Map:** a brace map helps analyze the various parts of the whole and their relationships. Visually, the supporting diagram looks like a side tree.
- **Bridge Map:** this is a map for finding similarities between things and creating analogies.

3.2.4 Collaborative Authoring Tools

Collaborative authoring enables multiple people to contribute to the same document synchronously or asynchronously. Collaborative authoring tools can be used throughout the entire writing process: planning, drafting, revision, and final product delivery. Users of the collaborative authoring tools can access and track course progress, communicate, provide feedback, making revisions, and seamlessly review peers' contributions, course progress, and evolution from a central point. Team members can work together as a team or work remotely. (Kaur, 2017).

The advances of this type of tool are flexible for the needs and mostly cloud-based, which is easier to access, safer storage, and cost-effective. Here are also listing some popular collaborative authoring tools: Office 365 (<https://www.office.com>), Google Docs (<https://docs.google.com>), Elucidat (<https://www.elucidat.com/>), Compositica (<https://compositica.com/>), Easy-Generator (<https://www.easygenerator.com/>), Gomo Learning (<https://www.gomolearning.com/>), Articulate 360 (<https://360.articulate.com/>), and Adobe Captivate Draft (<https://www.adobe.com/>). Each tool has different features, a suitable number of persons, and the cost. You may accord the needs of your course to choose the appropriate collaborative authoring tool.



Story 8. Collaborative Authoring Tools used in the course

In China, Collaborative Authoring Tools are used in the course "Reading and Writing of Academic Papers" taught by Professor Yanyan Li of Beijing Normal University. The course uses the collaborative platform developed by Beijing Normal University. In the course, the teachers posted one task online, and students would submit their final work through group learning. Every member of the group could choose one color unique for each of them. Through this color, the percentage of students' engagement would be shown on the platform. In the course of teaching the research method of English papers, the method of group collaboration is adopted, with each group comprising 4-6 students. The teacher first sends an academic paper on "Gamified learning" to each group, asking students to write a 200-250 word research process in English according to the flowchart, and then discusses the necessary information to be included in the writing of the research method, and difficulties in writing. Then the teacher organizes the groups to cooperate freely and complete tasks in a collaborative manner. Students can write directly or modify based on each other's writing. The total time is 60 minutes.

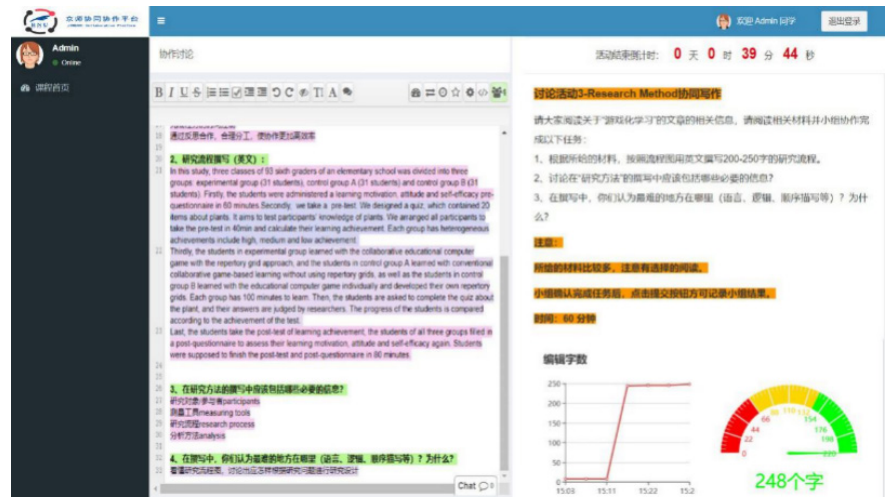


Figure 7. Operation Interface of Beijing Normal University Collaboration Platform

Source: <http://cscl.ironpy.cn/web/cl/bnucsl/login>

4 Facilitating Flexible Learning with Diverse Activities

Online learning should consist of various forms of learning activities through which students can achieve their learning outcomes and satisfy their personal requirements. Learners can acquire further information on the Internet and online libraries. Appropriate practice exercises should be embedded in the online lesson to establish the relevance of the materials. With feedback being provided, students can monitor how they are performing and adjust their learning methods if necessary accordingly.

4.1 Promoting interaction and communication

Interaction between students and teachers is the most important aspect for ensuring the quality of distance learning. Multiple methods could be used to reduce the interaction distance and to promote student interaction. Lecture via webinar, online discussion, project-based learning, online debate, brainstorming, experiential learning, and gamifying learning are discussed in the following.

4.1.1 Lecture via Webinar

In lectures via webinar, the instructor and students are simultaneously in virtual classes, and the instructor can host online lectures covering the same material they would use in a face-to-face classroom. There are many ways that an online lecture session can be utilized to give students the learning opportunities they would have in a face-to-face setting (“7. Professional Online Lectures”, 2020).



Tip 8. Hosting online lectures

- **Check for Attention:** Usually, every class is one to two hours, which makes it easy for you to lose students without knowing. You can keep their attention by stopping the lecture every twenty to thirty minutes and arrange something to increase their involvement, such as complete a poll, ask a question as a refreshment and type some short answers in the chat box.

- **Check for Understanding:** When finishing one section, you can ask students, “do you have any questions?”. Instead of shaking their heads, they need to show understandings so far by either clicking on the green checkmark (as found in some online webinar and lecture tools) or putting a smiley face in the chat box.
- **Group Work:** When you notice that your students are moving their attention away from the lecture, the best practice can be having students take on presenting and discussion management roles. Many webinars and online lecture tools have what is called “breakout rooms.” These are subrooms in the online lecture room to funnel students into smaller group work (“7. Professional Online Lectures”, 2020). Instructors can lecture for 15 minutes, then ask the students to have a group discussion, and then they go back to the class to show their ideas to all.
- **Encourage Interactivity:** The interactive platforms, hypervideos, and bullet subtitles can be used to overcome the lack of interaction. These functions can keep students engaged.
- **Outlining Visuals:** Annotation tools can be used to point out key contents on slides, make marks, circle an area on a graph. It can ensure students know what is proceeding.

Source: Sugar, W., Brown, A. & Luterbach, K. (2010). Examining the anatomy of a screencast: Uncovering common elements and instructional strategies. International Review of Research in Open and Distance Learning, 11(3), 1-20. Athabasca University Press



Story 9. An online lecture via Zoom

This semester, Matt Saunders launched the biggest studio art class at Harvard. The class of 72 students in “Painting’s Doubt” met weekly to learn figure drawing and paint from still life. The coronavirus outbreak forced Saunders to move the class online. On campus, students used to meet for a 75-minute weekly lecture and a four-hour weekly studio section. When transitioning to teaching online, Professor Saunders established a Zoom lecture (pictured) and formed smaller groups with six new discussion sessions led by teaching assistants, during which students share and discuss their work, which is now done independently.



Figure 8. An online lecture via Zoom

Source: <https://news.harvard.edu/gazette/story/2020/03/professors-learn-to-adapt-and-innovate-with-online-classes/>

4.1.2 Online discussion

The online discussion takes two forms: synchronous and asynchronous discussion.

(a) Synchronous online discussion

Synchronous online discussion, commonly supported by media such as videoconferencing and chat, has the potential to support students in the development of learning communities. Learners and teachers experience synchronous discussion as more social and avoid frustration by asking and answering questions in real time (Hrastinski, 2008). Synchronous sessions help e-learners feel like participants rather than isolates: Isolation can be overcome by more continued contact, particularly synchronously, and by becoming aware of themselves as members of a community rather than as isolated individuals communicating with the computer (Haythornthwaite & Kazmer, 2002).



Term 14. Cognitive presence

Cognitive presence is the extent to which the participants in any particular configuration of a community of inquiry are able to construct meaning through sustained reflection and discourse (Garrison, Anderson & Archer, 2001). From the perspective of cognitive presence, teachers can design strategies and organize activities such as experience sharing, discussion and debate to be aware of students' ideas and their level of understanding of learning content.



Tip 9. The guide to enhancing students engagement in synchronous online discussions

- **Choose a topic worth discussing.** The topic should be open-ended and have a certain value and difficulty. For example, facing the COVID-19, a lecture in Economics class can choose a topic stating “What government can do to prevent the recession?”
- **Recommend relevant learning materials to students.** Divergent arguments will provide students an insight into the topic.
- **Write comments and questions in advance.** Before teaching an online course, you should prepare for discussions, especially “live” chat room discussions, ahead of time, using your word processing program. By entering a question or comment beforehand, you can simply cut and paste it into the chat room discussion at the appropriate time without delaying the conversation.
- **Provide etiquette guidelines and chat rules.** Guidelines and rules for how the chat will be facilitated are a required component of the most successful chat room discussions. Your etiquette guide should include such topics as the order of questions, how to address

questions or comments, raising your hand or gaining attention, private discussions, as well as an agenda for the discussion.

- **Avoid sarcasm, idioms, slang, and jokes.** Do not use those cultural or regional communication techniques that can easily result in miscommunication.
- **Motivate, question, and praise the participants.** You can point out contradictory views in the discussion, encourage learners to think deeply, ensure the correctness of direction and increase the depth of the discussion.
- **Don't respond to every message.** Respond only to those that address you specifically or to which your response will make a valuable contribution to the discussion.
- **Don't try to multi-task.** Just as a loud radio or television would divert your attention while you are facilitating a classroom activity, so can other online technologies distract you from online engagement. Thus it is best to avoid multitasking while participating in online chat.
- **Keep a record or transcript.** Often the transcripts or records of what was discussed and decided during a synchronous chat will be of value later in the online course; keeping a record of the conversation can be critical. (Brown, Schroeder & Eaton, 2016)



Story 10. Online seminar via Zoom

1. Preparation

- 1) The seminar assignment and required readings were distributed before the online webinar.

The screenshot shows a web page for a seminar. At the top, there is a blue header with the text "Seminar 1: Market Failure" and a dropdown arrow. Below the header, the page is titled "Before class". The main content area contains the following text: "Before the seminar, you should go through the seminar Assignment. There are only two topics and you should be prepared to talk for up to five minutes about each of them. The seminars will take form of the online webinar via Zoom, the detailed instructions on how to join it will be provided later by your seminar tutor." Below this text, there is a link: "You may want to click [here](#) to get ready with Zoom (join in password *elearning*) beforehand." There are three items listed with checkboxes to their right: "Seminar assignment", "Rosen&Gayer_chapter7", and "Lepissier&Barder".

Figure 9. The seminar assignment and required readings

2. During the Seminar

1) In the beginning, the tutor described time allocations for each activity, what questions were expected to be answered and how to initiate a discussion among members in a breakout room in Zoom.

2) A total of 20 students was divided into 5 subgroups. In my group, I started presenting my views, followed by others raising different opinions and debates. The tutor engaged in the mid of our discussion and she encouraged us to summarize opinions in a table or a mind map.

3) One delegate of each group presented their discussions in front of 20 students. Then the tutor concluded with bullet points on a slide.

4) For the question that required model illustration, the tutor directly explained with slides by screen sharing and raised questions during her demonstration.

3. After class

1) Suggested answers will be posted on Moodle.

2) Students can ask questions regarding the content of a seminar in a Moodle forum.

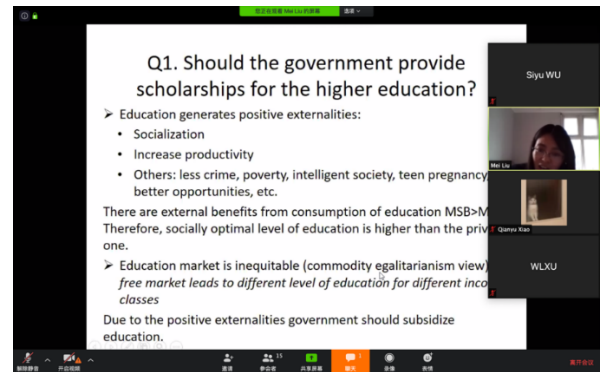


Figure 10. Online webinar

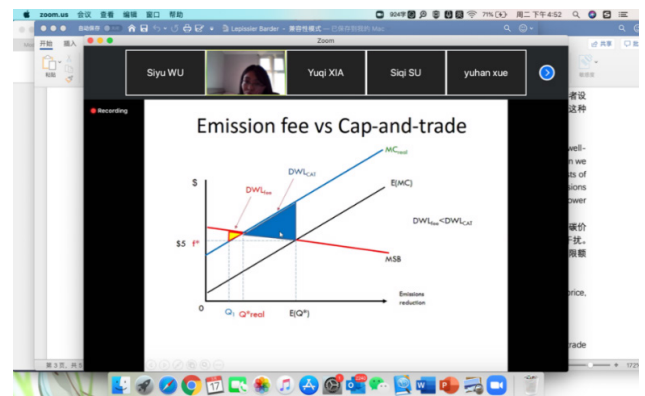


Figure 11. Model illustration

Source: <https://cbl.sites.yale.edu/about-us/sample-projects>

(b) Asynchronous online discussion

Asynchronous online discussions involve online interaction that is delayed and does not require simultaneous participation. Communication can occur through discussion forums where participants post messages and upload content. (Brown, Schroeder, & Eaton, 2016) Asynchronous online discussion is considered an extension of instructional practices that promotes dialogue, reflection, knowledge construction, and self-assessment. (Gerosa, Filippo, Pimentel, Fuks, & Lucena, 2010; Kayler & Weller, 2007) It potentially allows for more in-depth discussions and more thoughtful learning than is possible in traditional face-to-face settings (Hawkes, 2006)), because students in face-to-face discussions may not have sufficient time to think thoroughly before they respond. In online discussion forums, in contrast, the entire discussion is available for perusal, providing learners with opportunities for identifying, examining, and reflecting upon ideas. (Collison, Elbaum, Haavind, & Tinker, 2000)



Tip 10. The guide to fostering asynchronous online discussions

1. **Clarify expectations for participation.** Clear guidelines for how often learners should participate in a discussion board conversation should be communicated (for example, once a day, twice a day, twice a week), along with information on how the quality of their participation will be assessed.
2. **Create a schedule for participation.** As the lecturer, you need to maintain a “presence” in the forum space, providing students with “interactional scaffolding” - on-going support at the moment of need. Schedule times throughout each discussion board activity when you will participate in the conversation, including how much time you will spend responding to postings with your comments or questions.
3. **Do not respond to everyone and all postings.** Even as the facilitator of an online course, you will want to respond only to those postings that address you individually or to which your response will make a valuable contribution to the discussion. Find a balance of quality and quantity with your additions to the discussion.
4. **Use the subject line (and require learners to do so as well).** To reduce the amount of time and effort required for reviewing discussion board postings, it is important to include with each of your postings a summary description of the posting in the subject line.
5. **Resist over-analysis.** Don't read too much into the statements of learners or take comments too personally. Miscommunications are common in online communications since many of the everyday nonverbal communication cues (such as eye contact or body gestures) are not available.
6. **Take your time.** Try to edit and review your additions to the discussion board, it can help you to avoid miscommunications. It is a benefit of asynchronous discussions to have time to revise and improve your comments or questions, and you will want to use to your advantage.
7. **Lead by example.** Demonstrate high-quality responses, ask requests for learners' arguments, give examples and explanations, and help learners improve the quality of responses.
8. **Keep a record.** If discussion board postings will not remain available throughout the course, and you would like to keep the information contained in one or more of the postings, be sure to copy the posting to a word processing document that you can save to your personal computer.

4.1.3 Project-based learning

Project-based learning is a form of situated learning and it is based on the constructivist finding that students gain a deeper understanding of material when they actively construct their understanding by working with and using ideas. In online learning, group projects hold real-world implications, allowing students to investigate questions, propose hypotheses and explanations, discuss their ideas, challenge the ideas of others, and try out new ideas via internet forums, web conferencing and video sharing services. (Krajcik, & Blumenfeld, 2006) It is also called **guided discovery**.



Term 15. Guided Discovery

Guided discovery refers to a teaching and learning environment where students are actively participating in discovering knowledge. The goal of discovery is to facilitate deep learning on the part of the students – learning that has its basis in fundamental understanding and often arises from viewing a problem from multiple perspectives. The pedagogical underpinning is that if the students discover the knowledge, they will, in the process, have created and added to their own scaffolded understanding. They will have formulated and evaluated hypotheses, rejected those that don't seem to explain observations, confronted misconceptions, encountered surprises, and finally come to an understanding that comports with experiment. By re-creating knowledge which already exists but is heretofore unknown to them. (Sachs, 2018).



Tip 11. Six techniques for implementing project-based tasks in online learning (Capsim, 2020)

- Design the project around a challenging problem or question that features a real-world context or at least to address students' interests.
- Encourage students to keep sustained inquiry with the assistance of topic-related resources such as useful websites and research samples.
- Give learners access to support and clearly outline the parameters, then empower them over their learning process to make decisions on their own or by working collaboratively with peers.
- Integrate interactive scenarios and simulations that require a broad range of skills. Every choice students make in a simulation leads to a unique set of consequences, which allows them to explore the problem without any risk.
- Encourage students to reflect upon their learning processes, for instance, to ask whether there was another easier way to reach the same result, what worked, and what was hard to

get.

- Encourage peer-based feedback via online forums and project management platforms. (Larmer, Mergendoller, & Boss, 2015)
-



Story 11. Integrate online project-based learning into the international business course

The X-Culture Project ^①, initiated by Dr. Taras of the University of North Carolina, is one of the first attempts to enhance learning in International Business courses by allowing business students to experience the challenges and learn best practices of international collaboration by working with their international counterparts online. The main idea behind the X-Culture project is simple: students enrolled in International Business courses at universities around the world work together in global virtual teams on a project for about two months. While the participants are students, the international collaboration challenges they encounter are similar to those experienced by employees of multinational companies.

Before the project starts, students are randomly assigned to teams of about seven, typically with each team member being from a different country. They are instructed to develop a business plan for “the next big idea” for a multinational company of the team’s choice with the assistance of one coach who is likely to be an employee in a multinational company.

During the project, students are provided with rich online resources such as instructions on how to write business proposals, how to obtain information of the target company through interviews efficiently and other knowledge as well as skills that are required to outstand in a realistic global environment. As X-Culture participants are located in different places worldwide, communication and coordination among them are conducted using free online collaboration tools, such as email, Skype, Google+, Facebook, Dropbox, and Doodle.

In the end, each team must submit a business report, providing recommendations and a rationale for the location of the business, target market and market entry mode, staffing policies and other strategic decisions. In addition to the report, students’ performance is also assessed by getting access to rich data, including results of the pre-project training test, the ability of the students and teams to meet deadlines, multi-dimensional evaluations of team reports, and intermediary and post-project peer evaluations. Students are provided with feedback addressing their advantages and shortcomings in each step during the process.

In this case, X-Culture project provides International Business students with an opportunity to engage in a real-world scenario. Recent developments in communication and virtual collaboration technologies have made it possible to incorporate web-based international projects in International Business courses.

^① Source: Taras, V., Bryla, P., Gupta, S. F., Jiménez, A., Minor, M. S., Muth, T., ... & Zdravkovic, S. (2012). *Changing the face of international business education: the X-Culture project*. *AIB Insights*, 12(4), 11-17.

4.1.4 Online debate

The debate is a teaching method in which learners argue around specific issues and express their ideas. Learners are assigned to two sides (i.e., affirmative and the opposition), debating a topic related to the course content. The analysis from multiple perspectives can be improved through debate. For example, learners can debate the topic that “Can free speech on the Internet extend to schools?” Online debates can be held via video/voice conference, and asynchronous debates can be held in debate forums.



Tip 12. The procedure of organizing an online debate

- Select a topic that is relevant to the course content and has two contrast points of view, expressed as an affirmative statement and a negative statement.
- Divide the learners into groups (2-4 students per group), select the group leader, and organize the groups to choose positions and pair (such as which affirmative team is against which opposition).
- Select hosts and referees from learners who do not participate in the debate.
- Use the notification on the teaching platform to publish the debate time, process arrangement, and debate rules, etc., so that learners can clarify the debate process and regulations. For example, limit the speaking time of each debater; make the rules of turning on or off the microphone, camera, and interactive panel; clarify the duration of the asynchronous debate (such as one week), the daily posting party (such as the first day of the affirmative, the second day of the opposite, and so on, the last day the two parties submit their closing statements), posting requirements (maximum 1,000 words, posts can only be issued once) and so on.
- Provide resources related to the debate. For example, provide typical cases of debate for reference; provide language norms for debate, avoiding learners from using satires, idioms, jargon, slang, etc.
- Provide relevant guidance. For example, instruct the team leader on how to organize debate and how the moderator and referees preside over.
- For asynchronous debate, create a forum in the asynchronous discussion area of the course for each group to support the debate.
- At the end of the debate, the referee can announce the winner and the best debater in a synchronous debate; the winner and the best debater can be selected through interactive functions such as likes and voting.
- The teacher comments on the performance of the students during the entire debate.



Story 12. The great debate: Using the debate as a teaching tool in the online classroom

Delivered via a Lotus Notes learning platform, the rich, collaborative learning environment facilitates asynchronous debates that are thoughtful, reasoned, and reflective in Athabasca University's online Executive MBA program.

Preparation

The academic coach intentionally developed resolution topics that were current and controversial. For example, one debate resolution was "Be it resolved that project team-related issues (such as performance and disciplinary matters) are the sole responsibility of the functional manager to whom the team members report, and not the project manager's responsibility." He also assigned two groups of five students to argue either "for" or "against" a resolution.

Debate

There were five steps in the debate process:

(1) Develop a group code of conduct:

Each group prepared a code of conduct to guide the group work. Groups were asked to include group rules of engagement and processes for effective decision making and conflict resolution in the code of conduct.

(2) Develop a position statement:

In a private Lotus Notes® database accessible only to group members, each group developed a formal 1,000-word position statement based on the readings and course material. Students were encouraged to develop up to five convincing arguments for their side. Each group then posted its position in a database accessible to both groups.

(3) Develop a rebuttal to other side's position statement:

Each group then studied the position statement posted by the other group and developed a formal 1,000-word rebuttal to it.

(4) General discussion:

Once the rebuttals were posted, all members of both groups engaged in a final general discussion on the debate.

(5) Peer evaluation:

The students were asked to evaluate the participation of the members of their groups in the debate process.

Besides the peer evaluation, the academic coach also conducted the evaluation, looking for submissions that were clear, interesting, relevant, well organized, and engaging.

Noteworthy, the academic coach used the poll, an innovative way, to gather individual viewpoints on the topic after the debate was over. Following the position statements and rebuttals, the coach was curious as

to what students thought about the resolution, even though for the debate, they had to argue a specific side. He asked students to anonymously answer two questions in a survey he placed at <http://www.surveymonkey.com>:

1. Which side do you personally support?
2. What is your main reason for supporting this side?

This approach helped students to be aware of their own bias when analysing arguments.

This case suggests that forcing advanced students to take one side created innovative arguments and new insights for both the students and the academic coach. Polling the students added another level of reflective thinking to the teaching approach.

Source: Jugdev, K., Markowski, C., & Mengel, T. (2004). Using the debate as a teaching tool in the online classroom. Online Classroom, 4-7.

4.1.5 Brainstorming

Brainstorming is a group creativity technique by which efforts are made to find a conclusion for a specific problem by gathering a list of ideas spontaneously contributed by its members. People can think more freely, and they suggest as many spontaneous new ideas as possible. All the ideas are noted down without criticism, and after the brainstorming session, the ideas are evaluated. (Hicks, 2004)



Tip 13. How to organize brainstorming

- Identify the core subject or the main aim of the brainstorming. Putting together a well-stated problem and careful planning strategies can lead to meaningful idea generation and idea building, which can be used in solving problems or addressing specific course-related issues.
- The aim should be to generate as many ideas as possible within a set time frame, such as 30 minutes. Alternatively, you can set a target number of ideas, such as 100.
- A brainstorming session requires a facilitator, a brainstorming space, and something on which to write ideas, such as a software tool. The facilitator's responsibilities include guiding the session, encouraging participation, and writing ideas down. (Zhan, Zhang, Shi, & Liu, 2012)
- In computer-supported brainstorming, team members contribute their ideas through electronic means either synchronously or asynchronously.
- Create a relaxed environment that is supplied with adequate workspace and materials and free from distractions.
- Participants spend 10 to 15 minutes generating ideas on their own. Then put them in pairs, have them compare ideas, and add any more that come to mind. Then combine the pairs into bigger groups in order, again, to share ideas and add more.
- Throughout this process, ensure that there is no criticism and no squelching. As a facilitator, be sure to compliment every idea equally.
- If it is asynchronous brainstorming, limit the number of words and time for posting and encourage posting by likes or comments.
- At the end of the brainstorming session, students' feedback can be gathered through a formal course evaluation, regarding the pros and cons of the entire process and their achievements.
- At the end of the brainstorming session, the teacher should have a range of responses to use as a starting point for extending your students' understanding.

4.1.6 Experiential learning with virtual space

Experiential learning activities are carefully thought-out designs in which there are a definite learning purpose and intended outcome. Each step-everything that participants do during the activity-facilitates the accomplishment of the stated goal. Each experiential learning activity includes complete instructions for facilitating the intervention and a clear statement of goals, suggested group size and timing, materials required, an explanation of the process, and, where appropriate, possible variations to the activity. In order to overcome the lack of normal operation facilities and exercise environment, virtual reality technology can be applied to set up a desktop experimental environment or corresponding operation and exercise activities based on home conditions can be designed. (Ferreira, Sousa, Nafalski, Machotka, & Nedic, 2009; Hergueux, & Jacquemet, 2014)



Tip 14. Design considerations for virtual laboratories

- (A) Clarify the specific requirements, operation tools, operating procedures, and methods of the operation exercises, so that students can be clear of the target requirements and method procedures of the operation.
- (B) Be very clear about the purpose of the virtual laboratory, and in what context you intend it to be used. Consider which type of media you intend to build - simulation, laboratory, demonstration, and so on. Indicate clearly for the user what they are interacting with.
- (C) The units of operation exercises should be appropriate in size. Complex operations can be decomposed into independent sub-tasks so that students can obtain corresponding skills through their own practice.
- (D) Strive to use the simplest possible design and technology, still meeting the demands efficiently. In some cases, advanced technology such as virtual environments or even virtual reality might be needed, but the most eye-catching techniques might not always correlate with what is relevant to show.
- (E) Adapt levels of realism and accuracy to the intended target group as well as to the intended learning outcome.
- (F) Continuously consider enhancements of the virtual laboratory to increase the learning outcome. It can be profitable to provide help when needed and visualize things that are not possible in a real laboratory. Balance this potential against possible advantages of having a virtual laboratory that closely mimics real-life laboratory exercises.
- (G) Regard a virtual laboratory as an illustrative playground that requires external support in the form of guiding, explanatory texts, or teacher debriefing. The virtual laboratory provides the students with experience and observations, but does not always necessarily

offer an understanding on its own. Guidance is often necessary to help the students to understand the illustrated scientific phenomena (Wästberg et al., 2019).

(H) Various evaluations, such as self-assessment, peer assessment, and teacher evaluation, can be conducted after the class. Teachers need to help students reflect on their operations by providing them with reflection scaffolding along the way.



Story 14. Online experiments in VR environment

During the coronavirus pandemic, Professor of the Practice of Molecular and Cellular Biology Robert Lue in Harvard University combines live and recorded class meetings for his course “Cell Biology in the World.” on a virtual lab platform, LabXchange.

But how exactly can the experiment be done if virtual labs are not able to provide sufficient resources? In the course “An Integrated Introduction to the Life Sciences: Genetics, Genomics, and Evolution,” one assignment called for students to collect the biological sample from their environments, extract the DNA, and analyze the resulting data. Instead, Hopi Hoekstra (the professor of this course) and her colleagues collected samples from items including a cellphone, a boot sole, and a dog’s toy, and recorded a teaching fellow modeling the DNA extraction process. The team sent the samples to an external lab for sequencing and sent the resulting data to students for analysis. They were then assigned to match each sample’s DNA profile to one in a database.

Besides exploring new approaches in instructing experiments, professors in Harvard university also employ Zoom for live conversations, Canvas prompts for class discussion, Whiteboards for pre-lab quizzes, and post-lab assignments to ensure an overall process of classes go smoothly online.

In this case, the virtual lab allows students to experience the experimental process and repeat key operations. Meanwhile, with remote lab work, even though students miss the part of doing a real experiment, they still get to do part of the scientific process through analyzing data, interpreting results to find the answers to the unknown. Jumping out of particular patterns of doing things allows students and teachers to reassess what is really at the core.

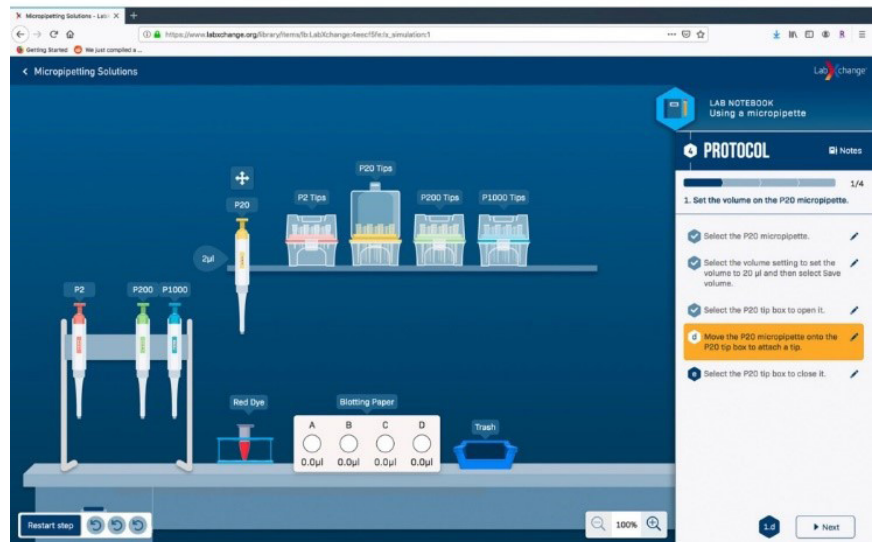


Figure 13. Online experiments in VR environment

Sources: <https://news.harvard.edu/gazette/story/2020/03/professors-learn-to-adapt-and-innovate-with-online-classes/>

4.1.7 Gamifying learning

Harnessing this powerful medium for pedagogical purposes, teachers can integrate games that are relevant to teaching content to the learning process. Educational games at their best are imaginary worlds, hypothetical spaces where players can test ideas and experience their consequences. During the exploration, students' understanding of subject knowledge and ability attainment can be enhanced. (Squire & Jenkins, 2003)



Tip 15. How to make your classroom truly engaging with educational games

- (a) It is difficult to align learning objectives with the educational model in game dynamics. So it must meet the objectives and achieve a proper alignment with the curriculum.
- (b) A better solution than having preset difficulty levels can be to have an adaptive difficulty ingrained in your game design.
- (c) Player interaction is an often-neglected but highly important aspect of games to consider.
- (d) The instructor should fill the gap between the game and the rest of the course by promoting reflection and discussion. (Moreno-Ger, Burgos, Martínez-Ortiz, Sierra, & Fernández-Manjón, 2008)
- (e) Virtual simulation technology can be applied in online games to simulate activities that cannot be repeated or realized in real-life situations, thereby reducing teaching costs and expanding teaching content.
- (f) Data acquisition techniques can be used to obtain students' learning process data, and then provide support for student evaluation and teaching adjustment.



Story 15. The application of medical simulation games

Queen's University has partnered with virtual reality innovators Sim for Health and HTC VIVE to build Canada's first medical virtual reality training center. The center will allow medical students and residents the opportunity to gain experience caring for patients in a realistic but completely safe environment. "Virtual reality offers exciting new opportunities for us to realistically simulate a wide range of clinical situations. We want learners to make all their beginner mistakes in the virtual environment, not on real patients." In the simulation case provided by SimforHealth, students will be immersed in a hospital and play the role of a physician taking care of a patient who has been admitted to the emergency room for chest pain.



Figure 14. The application of medical simulation games

In this case, through simulation of real hospital scenarios, the use of situational dialogue, principle simulation, data visualization, and other means enables students to obtain the same experience during the game as in the real scenario. Students conduct inquiries into the experience and acquire knowledge and skills in the process.

Source: <https://healthsci.queensu.ca/index.php/administration/announcements/queens-university-launches-canadas-first-vr-medical-training-centre>

4.2 Deepening meaningful learning

To enhance the effect of flexible learning, a series of strategies for independent learning and collaborative learning can be applied in online education.

4.2.1 Self-directed Learning

Self-directed learning in online education is a situation where learners take full initiative and ownership for their own learning journey, and complete present activities with extensive support from the teachers, especially in flipped learning. Teachers need to have self-oriented, motivated and disciplined students equipped with resources that help them achieve learning objectives and carry out the process of **knowledge building**, this being highly crucial when learning is acquired in online



Term 16. Knowledge building

Knowledge building refers to the process of creating new cognitive artifacts as a result of common goals, group discussions, and synthesis of ideas. These pursuits should advance the current understanding of individuals within a group, at a level beyond their initial knowledge level, and should be directed towards advancing the understanding of what is known about that topic or idea (Bereiter & Scardamalia, 2003).

environments. Resources that are widely employed include MOOC, recorded lectures and other resources relevant to the course content. Self-directed learning also takes various forms: students work individually or collaboratively through their course content. (Envoplan. 2020)



Tip 16. Four knacks to support self-directed learning

1. Instruct students to regulate actions towards goals of acquiring information, expanding expertise, and managing distractions.
2. Provide clear instructions and navigation along the learning journey. Each pre-set activity requires explicit explanations for the reference in the task completion.
3. Provide students with self-learning strategies that will enhance their learning abilities for a lifetime.
4. Organize Q & A sessions and gather feedback from students. Course feedback can be discussed between teacher and student, and teachers can offer help or extra assistance on any areas of study (e.g., getting access to resources, completing tasks) that the student is not confident with.



Story 16. Self-directed learning supported by MOOC

During the coronavirus pandemic, the online version of the course “Probability and Statistics” delivered by Rong Tengzhong, a teacher from the School of Mathematics and Statistics of Chongqing University, was published on MOOC platform. With video review function, quizzes and Q&A forums on the platform, students conducted self-assessment and then adopted “just in time” learning, reviewing recorded lectures where they are not confident with, tapping into existing answers in Q&A forums when a question arises without having to wait until the next day.

In this case, students synchronise learning with their own schedules. With the assistance of MOOC, they can choose how, when and where they work. Students learn in ways that best suit them as an individual, rather than waiting for the class as a whole.

Source: A new hybrid teaching model in the online course on “Probability Theory and Mathematical Statistics”.

4.2.2 Group learning

Group Learning provides a model of learning in which students are encouraged and supported to work together to create knowledge; to collect the divergent thoughts within a group; to compare, analyse and categorize the different ideas previously generated, through discussion and argument; to reach a level of intellectual synthesis, understanding, and consensus, usually through the joint construction of some artifact or piece of work, such as an essay or assignment. The role of the teacher or instructor in this process is seen as critical, not only in facilitating the process and providing appropriate resources and learner activities that encourage this kind of learning, but also, as a representative of a knowledge community or subject domain, in ensuring that the core concepts, practices, standards, and principles of the subject domain are fully integrated into the learning cycle. (Bates, 2018)



Tip 17. Methods of developing meaningful online collaborative learning

1. Appropriate technology (for example, software that allows for threaded discussions, for collaborative editing, and for idea visualization during brainstorming).
2. A key design principle in group learning is discussion forums are not additional or supplement to core teaching materials, such as textbooks, recorded lectures, and readings, but are the core component of the teaching. Textbooks, readings and other resources are chosen to support the discussion, not the other way around.
3. Clear guidelines on student online behavior, such as written codes of conduct for participating in discussions and ensuring that they are enforced.
4. Student orientation and preparation, including technology orientation and explaining the purpose of discussion.
5. Clear goals for the discussions that are understood by the students, such as: “to explore gender and class issues in selected novels” or “to compare and evaluate alternative methods of coding”.
6. Choice of appropriate topics, that complement and expand issues in the study materials, and are relevant to answering assessment questions.
7. Set an appropriate “tone” or requirements for discussion (for example, respectful disagreement, evidence-based arguments).
8. Define clearly learner roles and expectations, such as “you should log in at least once a week to each discussion topic and make at least one substantive contribution to each topic each week”.

9. Monitor the participation of individual learners, and respond accordingly, by providing the appropriate scaffolding or support, such as comments that help students develop their thinking around the topics, referring them back to study materials if necessary, or explaining issues when students seem to be confused or misinformed.
 10. Regular, ongoing instructor “presence”, such as monitoring the discussions to prevent them from getting off topic or too personal, and providing encouragement for those that are making real contributions to the discussion, heading off those that are trying to hog or dominate the discussions, and tracking those not participating to help them re-engage.
-



Story 17. Facilitating student engagement and collaboration in a large postgraduate course using wiki-based activities

Dr. Julia Salaber in Richmond University designed wiki-based activities to investigate the impact of these activities on student participation and collaborative learning in a large postgraduate international management course.

In the wiki-based task called “Small question – Lecture 1”, different questions were provided for each seminar group. The innovation was that students had to enter their collaborative answer, discussed in teams of 4 or 5 students on the wiki before each seminar. Questions for seminar groups A and B were reported.

In each group, there are six teams, and student answers can be accessed by clicking on each team’s name. Typically, the seminar tutor would read all answers before the seminar and give feedback in-class and out-of-class. The smiley face next to a team’s name corresponds to feedback from the seminar tutor as she flagged the best answers for students’ future review.

In this case, the wiki effectively acted as a facilitator for student engagement and collaboration, both in-class and out-of-class. Students recognized the positive impact of the wiki on their preparation for seminars, their engagement in problem-solving activities and their collaborative learning. Overall, they recognized that the wiki-activities had a positive impact on their learning over and above a more traditional way of preparing for seminars. Ultimately, the learning of discipline-specific outcomes and transferable skills have been achieved and the wiki-activities contributed to this outcome.

Source: Salaber, J., 2014. Facilitating student engagement and collaboration in a large postgraduate course using wiki-based activities. The International Journal of Management Education, 12(2), pp.115-126.

4.3 Motivating learner and scaffolding learning

A problem of inactive engagement of students in online learning activities has come to the surface as an increasing number of institutions familiarize themselves with online education. Instructors must encourage students to engage in the learning and interactions positively, although the task might not be easy to complete.

4.3.1 Acting as a good listener

In online learning, the role of instructors changes from expert presenter to designer and organizer of learning activities, the guiders and the facilitators of students learning. Therefore, the instructors have to be a listener first, to learn students' ideas, questions and requirements. (Lentell, 2003; Denis, Watland, Piroette, & Verday, 2004; Garrison & Arbaugh, 2007)



Tip 18. Four essential roles of the e-tutor

- a. Be Non-authoritarian. Avoid the authority figure role in the process of learning guide. If instructors show too much expert authority, the learner will become silent. Therefore, instructors should put down their authority and become learners' "quiet learning partners", encourage learners to communicate and share opinions freely, understand learners' problems, and identify learners' needs. (Berge, 1995)
- b. Identify the needs of learners. Before helping to solve problems, instructors should listen carefully and analyze the consensus/disagreement of learners views, clarify problems, identify what help is needed, such as knowledge understanding, the technical use, the difficulty of expression, etc., and help learners to establish a sense of **teaching presence**. (Haag, 1990)
- c. Design and organize activities, such as learning reflections, experience sharing, discussions, and debates. Then, instructors may understand learners' ideas and thoughts, identify learners' cognitive degrees and whether they know the application methods of the knowledge they learned, improve teaching guidance to help learners establish a sense of cognitive presence finally, avoiding **cognitive dissonance**.



Term 17. Teaching presence, Cognitive dissonance, and Social presence

A worthwhile educational experience is embedded within a Community of Inquiry that is composed of teachers and students. The model of this Community of Inquiry assumes that learning occurs within the Community through the interaction of three core elements: **cognitive presence, social presence, and teaching presence**. (Garrison, Anderson, & Archer, 2000)

Teaching presence is defined as the design, facilitation, and direction of cognitive and social processes for the purpose of realizing personally meaningful and educationally worthwhile learning outcomes (Anderson, Rourke, Garrison & Archer, 2001).

Cognitive dissonance is a means to facilitate the cognitive processes of accommodation and assimilation, which are central to knowledge development. Accommodation

- d. Listen and learn carefully whether the learners feel uncomfortable, whether the learners accept support from peers and teachers, whether they present themselves as real and functional human beings. Then, instructors could guide them to participate in online learning effectively and help them establish a sense of **social presence**. (Anderson, 2008)

and assimilation occur when learners are presented with new knowledge and must expend mental effort to integrate this information into their existing schema. (Piaget,1975)

Social presence is defined as the ability of learners to project themselves socially and affectively into a community of inquiry (Rourke, Anderson, Garrison & Archer, 2001).



Story 18. Know about students' learning conditions through their discussion

The University of Pennsylvania opened a course- “English in Science, Technology, Engineering, and Mathematics Context” on Coursera. Teachers learned about the learners' understanding of course content through learners' discussions. For example, Learners are allowed to express and discuss freely, and then teachers can know the learners' cognitive situation, and provide teaching guidance timely.



Unit 1 Assessment 1: Warming Experiment Factors

Based on your observations and the data you collected from the Global Warming Experiment, explain what factors you think contributed to warmer temperatures in Jar B. Why do you think this happened? How is this related to Global Warming?

After you post your ideas, reply to two other posts in the discussion board that you find interesting or that you agree or disagree with.

可以选择参与

在此输入您的回复...

回复

Figure 15. Know about students' learning conditions through their discussion

Source: <https://www.coursera.org/learn/stem/supplement/3AmaP/unit-4-assessment-2-speaking-and-recording-instructions>

4.3.2 Instant feedback

As a guide and facilitator of online learning, teachers need to deal with learners' issues or questions in a timely and constructive manner. (O' Rourke, 2012)



Tip 19. How to give feedback to students in online learning

- Instructors can weave several strands of conversation into a summarization that may prompt people to pursue the topic further.
- Timely feedback on assignments should be provided, and as near in time as possible within one week upon the submission. The feedback should include a positive compliment on learners' work, comments on problems and deficiencies, and suggestions for improvement.
- Provide clear guidelines for students on how to participate in learning activities. It is difficult for learners to focus on learning content, especially in the case of online asynchronous learning. Therefore, instructors tell learners what to do next and how to improve performance succinctly and clearly through timely feedback.
- Answer learners' questions on time. Instructors must reply to the learners' questions rapidly, especially technical problems. Because learners do not have enough patience with technical issues in online learning. It influences learners' learning willingness. Therefore, even if the instructors may not solve the problem right away, keep the learner informed immediately, like that "I have asked for help from others for you" or "Please ask other students to do you a favor" and so on, to ensure that instructors are equipped to provide feedback and supports. (Berge, 1995)
- Inform learners of the learning progress of others timely. In fact, learners often feel lonely and frustrated with online learning. By notifying other learning progress, learners may feel that other students are learning with them. And it is important for promoting learners' enthusiasm.
- Use affirmative and encouraging tones when interacting with learners. Instructors can give positive feedback to the ideas of the learner, highlight views, and help them build confidence.
- Make students feel that you are easy to approach. Teachers should use friendly language and express their emotions appropriately, which can make learners feel that teachers are easy going. Especially in the case of online learning in which students suffer time and spatial separation, it can make teachers more amiable.



Story 19. The application of feedback strategy in online teaching

In the “Project Planning and Management Fundamentals” course offered by Yeal Grushka-Cockayne of the University of Virginia, discussions were organized weekly. Tutors and teaching assistants gave learners the personalized feedback on discussions every week.

Can't understand Tornado Charts

Danilo Galimi Week 1 · 2 years ago

Goodmorning, I'm not able to find in the lecture "More Realistic Timelin 1" or any other videos or transcriptions into week1, a clear lesson about how to calculate Min Duration, Max Duration and from those , in what way Tornado chart came out? For example Finance Task, how could it float from 11 weeks to 17?

1 赞 回复 关注此讨论

最早 最热门 最新

Vijayakumar Menon N Mentor · 2 years ago

Hi Danilo,

Project Duration: 12 Weeks

Activity #	Description	Predecessors	Duration (Weeks)
1	Creative	-	5
2	Strategy	-	2
3	IT	-	4
4	Fundraising	1	4
5	Marketing	1,2	2
6	Sales	1,2	5
7	Finance	5,6	2
8	HR	4,6	1

Schedule Risk Analysis

Activity #	Description	Predecessor #	Min Duration	Likely Duration	Max Duration
1	Creative	-	3	5	7
2	Strategy	-	1	2	6
3	IT	-	3	4	5
4	Fundraising	1	2	4	8
5	Marketing	1,2	1	2	6
6	Sales	1,2	1	5	7
7	Finance	5,6	1	2	7
8	HR	4,6	1	1	1

In the above example, you can see that the following details about the Finance task :

Figure 16. The application of feedback strategy in online teaching

In this case, teachers and teaching assistants solved the problems in the learning process in time, which inspired the motivation for further learning.

Source: <https://www.coursera.org/learn/uva-darden-project-management>

4.3.3 Motivating your students

In online learning, the most annoying thing for instructors is that majority of learners do not participate in online discussion and learning activities. Therefore, one of the facilitator's jobs is to use whatever means necessary to guide and maintain involvement in online learning and interaction. (Berge, 1995)



Tip 20. Strategies to increase student motivation in online learning environments

- **Introductions.** In the beginning, learners are unfamiliar with learning environments, learning content, teachers, and classmates. The facilitator should provide an opportunity for participants to introduce themselves through sending welcoming messages, carrying out ice-breaking activities, building study groups, and clarifying the course evaluation criteria. Learners can get to know each other and overcome any uncertainties or lack of confidence by engaging with others in these non-threatening “warm-up” activities, help stimulate the curiosity of learners, eliminate the strangeness, build a sense of community. (Anderson, 2008)
- **Encourage Participation.** With the progress of online learning, learners are very prone to face the problems of decreasing motivation and learning burnout, which will affect the learning effect to a certain extent. By posting praise letters, sending learning reminders, issuing task checklists, and conducting peer evaluation, the learner can be stimulated to explore the connection between learning content and the real world, to maintain learning motivation.
- **There are three types of learners in online learning: active participants, divers, and non-participants.** Generally speaking, teachers are best able to insist on viewing the online learning data of learners every week. The three types of learners can be analyzed and identified through the log data of the learning platform. Teachers should affirm and praise the active participants timely, comfort and encourage the divers, pay continuous attention to and remind non-participants promptly. (Berge, 1995)



Story 20. The application of the incentive strategy in online teaching

In the “Arts and Activities: Interactive Strategies for Art Participation” course, provided by the Museum of Modern Art and lectured mainly by Jessica Baldenhofer, teachers designed a “Tell us about you” activity at the beginning of the course, asking learners to self-introduce to eliminate strangeness.

The screenshot shows a discussion forum with two posts. The first post is by Esra Dede, dated 5 months ago. She introduces herself as a creative writer and storyteller, currently a museum educator, and mentions her future role at a museum in Amsterdam. The second post is by Candice Cheung, dated 6 months ago. She introduces herself as an intern in the learning and interpretation team at the Museum of Modern Art, mentioning her degrees in Fine Art and Business Management.

ED Esra Dede · 5 months ago

Hi everyone!

My name is Esra and I am a creative writer and storyteller, mainly in the performative arts and recently I have started working as a museum educator, using my skills in writing and storytelling to interact with different groups, connecting them to different themes in life.

in 2020 I will work for a big museum in Amsterdam and I am eager to learn new skills in creating activities for my future participants!

↑ 0 个赞 回复

CC Candice Cheung · 6 months ago

Hi, my name is Candice from Hong Kong. I am intern in learning and interpretation team in M+ curatorial department. I graduated in Bachelor degrees of Fine art and Business management. I hope that I could learn how to plan and execute learning projects for the museum audience from different generations and backgrounds and also audience building.

↑ 0 个赞 回复

Figure 17. The application of the incentive strategy in online teaching

In this case, organizing a relaxed ice-breaking activity at the beginning of the course was helpful to boost the learning atmosphere, eliminate strangeness and create a sense of belonging, thereby laid a good foundation for learners’ participation in the course.

Source: <https://www.coursera.org/learn/art-activity/home/welcome>

4.3.4 Scaffolding on demand

Experienced teachers are able to build appropriate learning scaffoldings for learners to solve difficulties. The scaffolding is the support given to a student by an instructor throughout the learning process. It provides sufficient support to promote learning when concepts and skills are being first introduced to students. These supports may include resource, compelling tasks, templates, and guides, which might be helpful for learners to improve the efficiency of collecting information, transforming information, and finding solutions to problems. Scaffoldings can prompt learners to transform what they have learned across the “**zone of proximal development.**” The types of scaffolding in education and features, applications of each are presented in the table below:

Table 5. The types of scaffolding

Scaffolding Type	Features	Applications
Example Scaffolding	Goal-oriented	Provide examples, templates, models, etc. for learners to imitate and use them for reference to complete tasks, especially in the case study
Problem Scaffolding	Enlightening; Able to shift learning responsibilities from instructors to learners; Able to conduct continuous diagnosis; Have guiding effects, Easy to operate	Ask questions from easy to difficult to inspire students' deep thinking. Let students answer independently first, and then give answers.
Suggestion Scaffolding	Temporary; Dynamic; Able to give students feedback in time	Provide learners with suggestions, tips, and methods.
Guide Scaffolding	Cognitive structured	Provide systematic guidance to students according to their cognitive characteristics.
Chart Scaffolding	Structured; Visualized; Systematic	Make students easier to learn through intuitive visualization
Tool Scaffolding	Diverse, Easy to operate; Characterized by situation	Provide students with tools to solve problems.



Tip 21. Four main principles to construct learning scaffolds

1. Scaffolding should be temporary. Just like the scaffolding used in the building construction, the supports are temporary. As students master the assigned tasks, the supports are gradually removed.
2. Scaffolding should be adjustable. The scaffolding should be adjusted accordingly to the dynamic zone of proximal development. Improperly designed scaffolding will fail to play its role in the learning process and even limit learners' thinking.
3. Scaffolding should be tailored. Learners of different levels need different types of scaffolding to avoid **cognitive conflict**. The higher the cognitive requirements, the more scaffolding are demanded.
4. Scaffolding can not only be provided by teachers, but also can be given by learning partner and even learners themselves. (Sawyer, 2005)



Term 18. Zone of proximal development

The zone of proximal development is an area of learning that occurs when a person is assisted by a teacher or peer with a higher skill set. The person learning the skill set cannot complete it without the assistance of the teacher or peer. The teacher then helps the student attain the skill the student is trying to master until the teacher is no longer needed for that task (Chaiklin, 2003; Burkitt, 2006).



Term 19. Cognitive conflict

Cognitive conflict is a psychological state involving a discrepancy between cognitive structures and experience, or between various cognitive structures (i.e., mental representations that organize knowledge, beliefs, values, motives, and needs) (Festinger, 1957). This discrepancy occurs when simultaneously active, mutually incompatible representations compete for a single response (Piaget, 1975).



Story 21. The application of example scaffoldings in online learning

In the online course “Learning to teach online” provided by Associate Professor Simon of the University of New South Wales, the teacher provided a series of teaching materials, detailed and diverse cases and learning suggestions on how to design online learning activities. These resources provided guidance and support for learners to design teaching activities independently.



Planning Online Learning + Online Learning Activities

'Module 3: Planning Online Learning' will explore the importance of planning online learning from a pedagogical perspective rather than a technology driven one. Careful planning is one of the most important aspects of teaching online, and success often depends upon taking the time to consider all of the different aspects of the online learning experience before you begin. The content and activities will explore the concepts of constructive alignment, choosing which aspects of a class are best done online or face-to-face, building digital literacy capabilities within your students, and examining your own motivations for wanting to teach online in the first place. 'Module 4: Online Learning Activities' will identify important considerations you need to keep in mind when developing online learning activities for your students. We will offer advice about how to plan an online activity, and help you think about which may be appropriate for your own students. When you are new to the process, understanding which online technology best supports different learning activities can be daunting. This module, along with a range of case studies, and activities, will explore the relationship between different technologies and specific activities in more depth.

[显示较少](#)



16 个视频 (总计 101 分钟), 2 个阅读材料, 5 个测验 [查看全部](#)

Key Concept - Online Learning Activities 1分钟

Case Study - Video Conferencing in Museum Education (K-12) (Optional) 9分钟

Case Study - Considerations for Choosing Technology (Optional) 5分钟

Case Study - Teaching with Web 2.0 Technologies: Twitter, Wikis and Blogs (Optional) 8分钟

Case Study - Using Online Lectures to Support Active Learning (Optional) 7分钟

Case Study - iLabs - Online Access to Remote Laboratories (Optional) 7分钟

Case Study - Using Flickr as an Online Classroom (Optional) 9分钟

Figure 18. The application of example scaffoldings in online learning

Source: <https://www.coursera.org/learn/teach-online>

5 Checking Learning Outcomes and Evaluating Accordingly

Learning outcomes are an essential part of any unit outline. A learning outcome is a clear statement of what a learner is expected to be able to do, know about and/or value after a unit of study, and how well they should be expected to achieve upon completion of the course. It states both the substance of learning and how its attainment is to be demonstrated.

The assessment process examines the extent to which students have achieved the intended outcomes of the unit. Therefore in designing an assessment program, the learning outcomes must form the basis of what is assessed and how it is assessed.

Each outcome should be assessed. If a stated outcome is not assessed, neither you nor your students will know if it has been realized. If the learning outcome is framed in such a way that assessment is not feasible, you need to reframe it so that the demonstration of attainment is possible.



Term 20. Learning Outcomes

Learning outcomes are statements of the knowledge, skills, and abilities individual students should possess and can demonstrate upon completion of a learning experience or sequence of learning experiences (Allan, 1996). Achieving the learning outcome results in narrowing or closing the identified gap between current state and desired state, i.e., the difference between what is and what should be. The learning outcome can assess the overall impact of multiple objectives (UCLA, 2016).

5.1 Categories of learning outcomes

Learning outcomes are measurable, specific goals and results that students expect to achieve after the course ends. It is from the perspective of students, focusing on the assessable results that students can achieve after successfully completing their studies, including knowledge, skills, and attitudes, that is, results in terms of cognition, behavior, and emotion. Since the learning results must be evaluable, specific behavioral verbs are often used when describing the learning outcomes, and thus they are specific, measurable, achievable, relevant, and time-bounded.

5.1.1 The value of effective learning outcomes statements

The learning outcome helps better urge students to learn and increase motivation for learning. It has a better guiding effect on the students' learning process. Clearly stated learning outcomes could enable students to clearly understand the knowledge and skills they need to master after learning, help students concentrate on the learning process and improve learning efficiency. Clearly stated learning outcomes are specific and evaluable, which can encourage students to take the expected results seriously and enhance their motivation to learn.

The learning outcome helps teachers focus on the teaching process. It has a direct guiding effect on the teaching and learning process. It is also conducive to the consistent integration of the entire teaching process.

The learning outcome helps teachers to evaluate the learning and give feedback. The learning results must be evaluable, which helps teachers to immediately evaluate the teaching effect and adjust teaching content, teaching methods based on the feedback.



Tip 22. Writing learning outcomes statements

- When describing learning outcomes, it is necessary to clarify what students should know and what they can do at the end of the course.
- Use measurable and evaluable verbs, and do not use abstract words such as comprehension, and know how to state learning outcomes.
- There may be other, more appropriate, discipline-specific action verbs as well (for example, as components of professional competency statements).
- Try to keep to one discrete learning outcome per statement, unless they are closely related.
- Focus only on what's important; the statement of outcomes should reflect students' comprehensive abilities, skills, attitudes and/or values
- As a guide for learning and teaching, generally about 4-6 statements of learning outcomes in a unit are sufficient.

5.1.2 Identifying the range of knowledge and cognitive skills in the unit

There are different kinds of knowledge. Biggs (1999) identifies four kinds:

- Declarative knowledge: knowing what, or knowing about – the “content” of knowledge
- Procedural knowledge: knowing how to do things
- Conditional knowledge: knowing when to do things
- Functioning knowledge: knowing how to employ the first three types of knowledge to solve problems and function as an effective professional.

The range of cognitive skills include:

In higher education, we do not want students to recall a large amount of information as needed simply, but to pay attention to whether they can use the knowledge they have learned in different situations and use critical thinking to express their views. From simple memories to critical thinking, cognitive skills are hierarchical.

It's important that when students engage in learning, the cognitive, affective, and psychomotor aspects of their learning are in fact inseparable.

5.1.3 Multiple types of assignments as learning outcomes

Many types of assignments can be done online. Below are some examples of online assignments, but they certainly do not represent all of the possibilities.

- Reading
- Discussions
- Case studies
- Quizzes
- Report display
- Practice exercises
- Virtual tutorials or labs
- Essays (submit online) Online literature searches
- Simulations
- Role play
- Game
- Design

You can draw the relationship between learning outcomes and assessment tasks to find missing or underestimated content, and highlight where you over-evaluate a particular learning outcome. For example:

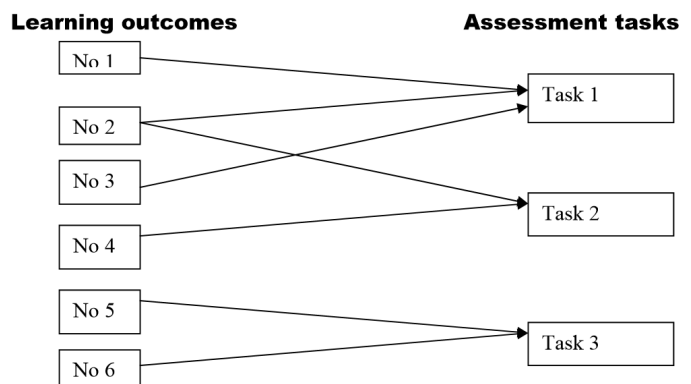


Figure 19. Relationship between learning outcomes and assessment tasks



Tip 23. Creating an online assignment

1. Briefly describe the tasks that students need to complete.
2. You can ask yourself the following questions to help you describe the assignment more clearly.

Type of issue	Focusing questions
Goals/objectives	What do I most want students to learn from this assignment?
Contextual	Who are my students? Do they know how to use the technology I' ve chosen for my assignment? Do they have access to a computer?
Content	What about the assignment content or goal lends itself to being an online assignment?
Teaching methods	How should I teach so my students can do this online assignment?
Assessment	Why would I use an online assignment? How will I grade this assignment? What kind of feedback do I need to provide to the students on their completed work or work in progress?

3. The description of the assignment should stimulate the motivation of students to participate, willing to complete this task.
-

5.1.4 Linking learning outcomes to teaching and learning strategies

The verbs used in the description of learning outcomes should best represent the learning goals the students should achieve. For example, if a learning outcome is to allow students to explain the causes of global warming, there should be activities that require students to analyze the influencing factors of global warming and give them the opportunity to monitor, evaluate and receive. In the process of participating in activities, these skills can be practiced and improved. The table links learning outcomes with assessment tasks and teaching strategies.

Table 6. Learning outcomes and teaching strategies

Learning outcomes	Teaching & learning strategies	Assessment tasks

5.2 Utilizing appropriate instruments for assessment

Some instruments can be used for assessment.

5.2.1 Online examination

Written Exams are a great way to assess what the students have learned with regards to particular subjects and discrete skills students have developed.

The written examination includes the following type of tests: essay type and objective type. Essay type test is commonly employed to measure the levels of reasoning, interpretation, and criticism as it requires students to state their arguments in the essay form. Objective type questions are answered by writing one or two words, or numerals, filling in the blanks, choosing one cut of multiple responses given, etc. In objective tests, the power of memorization and recognition can be checked. Due to the quite simple and clear scoring criteria it follows, the objective-type test is a reliable, valid and efficient assessment tool embedded in the online learning platforms. (Uu.edu, 2020)



Story 22. The written examination as an evaluation method of learning processes and outcomes on Coursera

Barbara Oakley of McMaster University organized an online course “Learning How to Learn: Powerful mental tools to help you master tough subjects” on Coursera. This course had the learning modules weekly, including weekly learning resources such as videos, readings and module quizzes. These quizzes provided a tool for students to carry out self-assessment of the module content, and also provided information for teachers to understand learning conditions. Besides, at the end of the course, the students’ overall mastery of the course would also be tested through the quizzes.

In this case, quizzes offered a diagnosis for the current situation and feedback for follow-up learning. The instructor used them to evaluate the learning effect and decided if the course certification would be awarded.

Source: <https://www.coursera.org/learn/learning-how-to-learn>

Introductory Quiz (Lots of fun and useful info!)

总分: {TOTALPOINTS}

1. I need a reliable internet connection to submit my quizzes and assignments, and it's a good idea to keep a backup copy of my work to prevent it being lost. 1分
 True
 False
2. I am invited to participate in the discussion forums, where I can ask questions and share my opinions, but I must not make abusive or spam-like posts. 1分
 True
 False
3. I must not post the questions or answers to the quizzes in the discussion forum or anywhere else. This would be a breach of Coursera's [Honor Code](#). 1分
 True
 False

Figure 20. The written examination as an evaluation method

5.2.2 Rubric

In education terminology, rubric refers to a scoring guide used to evaluate the quality of students' constructed responses. A rubric can be used in individual assessment within the course, or a project or capstone project, which usually evaluates advanced learning skills. (Becker, 2011)



Tip 24. The guide to designing a meaningful rubric

- **Consider the purpose.** Different rubrics serve different purposes. Task-specific rubrics are written to help teachers assess individual assignments or genres, whereas generic rubrics are written to help teachers assess multiple assignments. (Teachingcommons.stanford.edu, 2020b)
 - **List the important qualities that you expect to be presented in the assignment.** It may be helpful to search for several excellent assignments before you develop a rubric: what elements do they all have in common? These may include features of the argument, such as a main claim or thesis; use and presentation of sources, including visuals; and formatting guidelines such as the requirement of works cited.
 - **Consider how the criteria will be weighted in grading.** Perhaps all criteria are equally important, or perhaps there are two or three that all students must achieve to earn a passing grade. Decide what best fits the class and requirements of the assignment (White, 1985).
-



Story 23. A rubric applied in evaluating critical thinking and problem-solving skills

The Critical Thinking/Problem Solving Rubric developed by the Stanford University Learning Evaluation Center divides critical thinking into five dimensions: defining problems, analyzing evidence, applying/transferring knowledge, problem solving, evaluation and reflection. There are 4 grade levels: formation, development, proficiency, and excellence. Using this rubric can provide an analytical framework for the evaluation of critical thinking of students.

CRITICAL THINKING / PROBLEM SOLVING RUBRIC (GRADES 9-12)							
SCORING DOMAIN	EMERGING	E/D	DEVELOPING	D/P	PROFICIENT	P/A	ADVANCED
PROBLEM FORMULATION <i>What is the evidence that the student can identify a clear and specific problem, challenge or question to investigate?</i>	<ul style="list-style-type: none"> Identifies an unclear problem, challenge, or question to investigate based on incomplete or irrelevant information gathered from the context Asks questions about the problem that are off track. 		<ul style="list-style-type: none"> Identifies a broad or general problem, challenge, or question to investigate based on incomplete but relevant information gathered from an authentic, real world context Asks questions to break down the problem, propose explanations, and to guide the inquiry that are generally reasonable but not supported by a knowledge base 		<ul style="list-style-type: none"> Identifies a clear and specific problem, challenge, or question to investigate based on relevant information gathered from an authentic, real world context Asks focused questions to break down the problem, propose reasonable, knowledge-based explanations, and to guide the inquiry 		<ul style="list-style-type: none"> Identifies with precision a clear and specific problem, challenge, or question to investigate based on relevant information gathered from an authentic, real world context Asks questions to break down the problem, propose explanations, and to guide the inquiry that are focused, precise, and well grounded in a knowledge base
ANALYZE EVIDENCE <i>What is the evidence that the student can analyze and evaluate the credibility of sources?</i>	<ul style="list-style-type: none"> Summarizes information and arguments from sources and treats all evidence as equally credible OR One source dominates 		<ul style="list-style-type: none"> Summarizes information and arguments from sources and begins to question the credibility of some of the evidence 		<ul style="list-style-type: none"> Analyzes information or arguments from sources, taking into account author point of view, purpose, or other relevant context information, to question and make judgments about their credibility 		<ul style="list-style-type: none"> Thoroughly analyzes and evaluates information and arguments from sources, taking into account author point of view, purpose, or other relevant context information, to select credible sources
APPLY / TRANSFER KNOWLEDGE (REASONING) <i>What is the evidence that the student can develop an accurate understanding of a topic and apply/transfer their knowledge to a new situation ?</i>	<ul style="list-style-type: none"> Relies primarily on one source to develop an over-simplified understanding of a topic/issue Makes broad generalizations that are based on faulty reasoning OR over-generalizes Understanding of the problem at hand is incomplete 		<ul style="list-style-type: none"> Identifies broad or general relationships among evidence from diverse sources (e.g., compare and contrast) to build a reasonable understanding of a topic/issue Makes broad but reasonable generalizations Draws connections from generalizations to develop a general understanding the problem at hand 		<ul style="list-style-type: none"> Identifies clear and specific relationships among evidence from diverse sources (e.g., compare and contrast, classify, cause and effect, process and product) to build an accurate understanding of a topic/issue Makes logical, evidence-based generalizations Draws specific connections and extends generalizations to develop an accurate understanding of the problem at hand 		<ul style="list-style-type: none"> Develops a systems model to precisely represent the complex relationships among evidence from diverse sources to build a credible, knowledge-based, complex understanding of a topic/issue Makes logical, evidence-based generalizations, with an understanding of their limitations and exceptions Draws specific connections and extends generalizations to develop an accurate and complete understanding of the problem at hand

In this case, the rubric is used for the evaluation of critical thinking. Given the characteristics and manifestations of thinking itself, the rubric is designed based on the five aspects of critical thinking and four different levels of manifestations. This rubric can provide a basis for students to carry out self-evaluation or for teachers to carry out student evaluations.

Source: <https://mp.weixin.qq.com/s/OKzqSMvIztgpQaKzLDilqQ>

5.2.3 Self checklist

Self checklists are a tool that states specific criteria and allows students to gather information and identify the presence or absence of conceptual knowledge, skills, or behaviors. Instances in which they are particularly useful in the context of self-evaluation include the analysis of documents (for example, students' written work) and off-class reflection (for example, student insufficient skills). (Irish Department of Education and Skills, 2020) Well-designed checklists assist students in evaluating learning performance and identifying steps they can take to complete complex tasks, which scaffolds students' metacognitive development and fosters the confidence and independence needed for internalizing these steps for future tasks. (Rowlands, 2007)



Tip 25. Best practices for developing checklists to support the student in the online learning

- Depending on the learning content, you can choose the presentation form of self-check list such as rating scales and table.
 - Ensure that the characteristics and descriptors listed are clear, specific and observable.
 - Decide on the response simply such as “Yes” or “No”, or as descriptors indicating quality or frequency (for example, always, usually, sometimes and never).
 - Use templates that have tasks chunked into logical sections or flow from start to finish.
 - Leave space to record anecdotal notes or comments.
 - Encourage students to assist with constructing appropriate criteria. For example, what are the descriptors that demonstrate levels of performance in problem solving? (British Columbia Institute of Technology, 2020)
 - Students should be guided to well use the self-checklist for course learning evaluation, self-supervision and reflection.
-

5.2.4 Learning contract

The learning contract is an agreement negotiated between a learner and a supervisor to ensure that certain activities will be undertaken to achieve an identified learning goal, and specific evidence will be produced to demonstrate that goal has been reached. When a student becomes a party to a learning contract, he becomes more intimately involved in his own education; that is, the learning process becomes more self-directed. The responsibility granted the student by engaging in the contracting process and in making decisions concerning their own education often increases their internal motivation. The contract gives students an overview of learning expectations other than just working for marks; it allows the student to gain satisfaction from meeting their goals.



Tip 26. The steps in creating a learning contract

1. A learning contract usually has a written record of a series of negotiated learning goals/objectives. These are set between the student and the tutor/expert. They include the strategies and resources by which these goals can be met, the evidence which will be presented to show that objectives have been achieved and how the learning outcomes will be assessed. (Ucdoer.ie, 2020)
2. Before starting a contract, identify the student’s skill level and the gap between the current situation and the expectation, so that the learning objectives can be clearly defined.
3. During the contract, keep checklists and anecdotal records, monitor the student’s performance and discuss his progress or problems, check the student’s work jointly, and make shared evaluations.
4. In the process of implementing the learning contract, the instructor’s responsibility is to monitor the student’s learning process by keeping checklists as well as anecdotal records, discussing his progress or problems, jointly checking the student’s work and making shared evaluations. If the student believes that there is something that needs to be modified in the learning contract, he can discuss it with you in time to revise the content of the learning contract.

5. If a student encounters learning goals that may not be reached, you and your student should take remedial measures in order to maximize the learning outcomes.
6. When the contract is completed, the student should hand over the learning contract and the evidence for completing the learning objectives to the instructor, and the teacher gives grades/marks for completion of task, and gives feedback on work habits and general behaviors.



Story 24. The use of learning contracts in mental health nursing clinical placement

To evaluate the use of learning contracts during a mental health clinical placement with cohort nursing students undertaking a 4-year pre-registration Bachelor of Nursing program, researchers of the Chinese University of Hong Kong participated in developing the course content and teaching strategies, including developing the system of contract learning.

An example of one nursing student's learning contract

Name of clinical teacher: XXX		Name of student: XXX	
Period of placement: May 1999		Unit/ward: Acute admission ward	
Learning objectives	Learning resources and strategies	Evidence of accomplishment	Means of validating evidence
1. Demonstrate ability in teaching patients on the side-effects of neuroleptics	a. Read 3 journal articles and the textbook related to the topic b. Observe and consult staff member conducting the patient teaching	Conduct a teaching session for a small group of patients in ward	Be observed by clinical teacher and ward staff during teaching session
2. Demonstrate skills in caring for a patient before and after electroconvulsive therapy (ECT)	a. Read textbook, video and hospital protocol b. Participate in the ECT sessions c. Observe staff performance during procedure d. Discuss with ward nurses about the principles of care	Perform care for one patient before and after ECT	Be observed by and discuss with clinical teacher and nurse specialist
3. Demonstrate skills in caring for an aggressive patient	a. Read relevant hospital guidelines and standard b. Discuss with nurse specialist c. Observe and practise the skills under supervision of nurse specialist	Describe and evaluate the protocol for care of aggressive patient in post-clinical conference, and give examples to illustrate the principles	Discuss with clinical teacher, nurse specialist and peers Present a care plan for one aggressive patient

By the second week of the clinical placement, all the students proceeded to learn through their learning contracts by structured activities or specially arranged clinical situations related to their learning objectives. At the end of each clinical day, each group of students and their clinical teacher met to discuss any difficulties encountered and reflected on specific clinical learning issues. Students were expected to share their learning experiences. Clinical teachers also discussed the learning progress with their students regularly in groups and individually. At the midpoint and end of the placement, the clinical teachers assessed the students according to the criteria of accomplishment written in the contract, listened to the students' self-evaluation, and provided constructive feedback for future development.

In this case, students' autonomy and motivation in clinical learning increased through the use of learning contracts. There was more sharing between students and teachers, and the quality of teaching and learning was improved.

Source: Chien, W. T., Chan, S. W. C., & Morrissey, J. (2002). The use of learning contracts in mental health nursing clinical placement: an action research. International Journal of Nursing Studies, 39(7), 685-694.

5.2.5 e-Portfolios

e-Portfolio (electronic portfolio) is a purposeful collection of sample student work, demonstrations, and artifacts that showcase student's learning progression, achievement, and evidence of what students can do. The collection can include essays and papers (text-based), blogs, multimedia (recordings of demonstrations, interviews, presentations, etc.), graphics. A good e-Portfolio is both about being a product (a digital collection of artifacts) and a process (of reflecting on those artifacts and what they represent). (Teaching.berkeley.edu, 2020; Banta, 2003)



Tip 27. How to assist students in developing an e-portfolio

- **Explain the benefits of e-Portfolios to students.** e-Portfolios can help learners develop new or deeper learning, which results in advanced skills attainment; help learners to be aware of how they can learn from reflections (Paulson & Paulson, 1991).
- **Establish a clear selection of artifacts.** Determine the type of e-portfolios and the standards for collection and selection of materials according to the needs of the teaching objectives to avoid excessive or chaotic collection (Barrett, 2008; Basken, 2008).
- **Walk the talk.** Create an e-Portfolio for yourself and share it with your students. You'll better understand the challenges and benefits of maintaining an e-Portfolio, and it will also persuade students that it is a useful endeavour (Bass & Eynon, 2009).
- **Scaffold student learning.** Students are the builders and users of e-portfolios. Guide students to use the portfolios for self-evaluation and reflection, to stimulate students' subjective awareness and reflection awareness, and to effectively guide students' development (Tosh, Light, Fleming, & Haywood, 2005).
- **Collect materials.** The collection of evaluation materials in the e-portfolio must be continuous, reflecting every change in the student's learning process, and clearly present the student's learning process and efforts.
- **Tie e-Portfolios to assessment.** Maintaining an e-Portfolio demands a significant amount of time and energy from students, and they will resent it if their time and energy are not reflected in their final grade. If e-Portfolios are merely an optional assignment that is encouraged but not required, most students will not undertake one. (Kuh, Kinzie, Schuh, & Whitt, 2005)
- **Make it social.** Integrate viewing and commenting on other students' e-Portfolios as part of the assessment. You could, for example, create a discussion forum where students make helpful and encouraging comments on one another's e-Portfolios. The e-Portfolios, then, become an integral part of the online community of students. (Entwistle & Karagiannopoulou, 2014)



Story 25. The use of e-portfolios to make students showcase their learning process

Chang, Tseng, and Yueh, et al. researched graduate students in a course on “Digital Test and Assessment”. The three class assignments were the design of an online test system, the design of the online assessment system, and digital concept map creation and assessment. Students were allowed to include the three works in their e-portfolios to present their achievements and learning process.

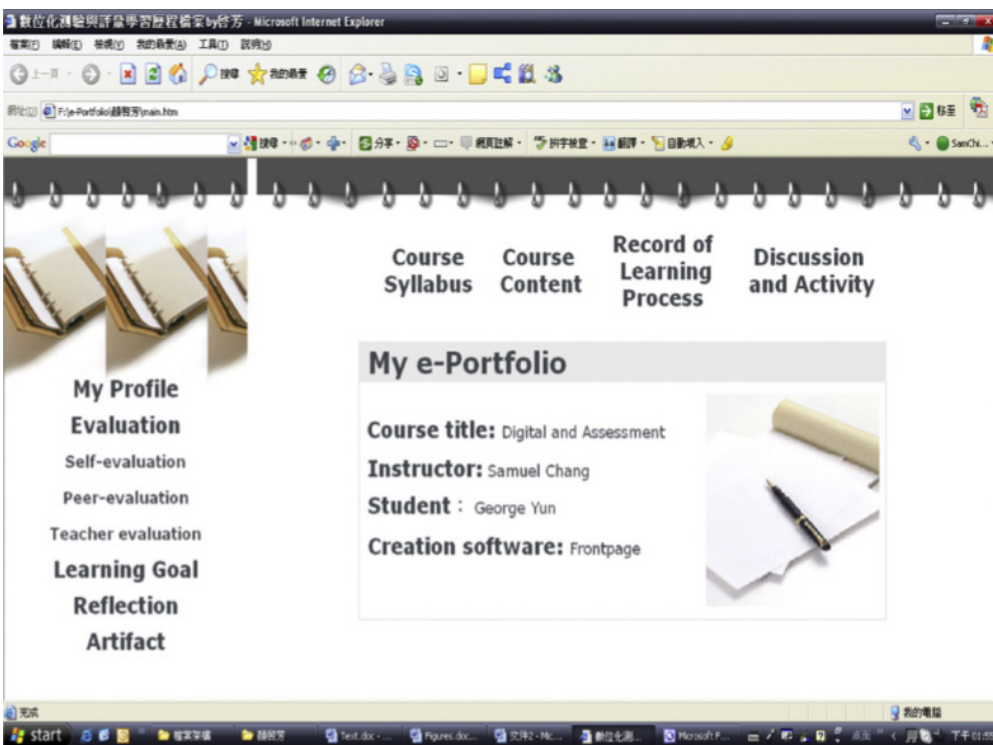


Figure 21. The use of e-portfolios to make students showcase their learning process

In this case, e-portfolio provided favorable conditions for learning assessment. Teachers used e-portfolio to focus on students' learning process, provide guidance for learning, encourage learners to reflect on themselves, and thus enhanced learners' self-management awareness.

Source: Chang, C. C., Tseng, K. H., Yueh, H. P., & Lin, W. C. (2011). Consideration factors and adoption of type, tabulation, and framework for creating e-portfolios. *Computers & Education*, 56(2), 452-465.

5.2.6 Learning analytics

Learning analytics is the measurement, collection, analysis, and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs. The growth of online learning in higher education has contributed to the advancement of learning analytics as student data can be captured and made available for analysis. When learners use an LMS (Learning Management System), social media, or similar online tools, their clicks, navigation patterns, time on task, social networks, information flow, and concept development through discussions can be tracked. The rapid development of massive open online courses (MOOCs) offers additional data for researchers to evaluate teaching and learning in online environments. Integrating learning analytics, as an evaluation instrument, into the learning process is gradually becoming the focus of online learning development. (Society for Learning Analytics Research, 2020; Siemens, Dawson, & Lynch, 2013)

The following table provides diverse learning analytics tools, such as learning network analysis tools, learning content analysis tools, learning ability analysis tools, and learning behavior analysis tools.

Table 7. Diverse learning analytics tools

Tools name		Analysis object	Function	license
Learning network analysis	SNAPP	Social network relationships in LMS platform.	SNAPP is a software tool that allows users to visualize the network of interactions resulting from discussion forum posts and replies.	Free&Open source
	Gephi	Social network	Gephi is the leading visualization and exploration software for all kinds of graphs and networks.	Free&Open source
	NetMiner	Social network, Data Mining	NetMiner is a premium software tool for Exploratory Analysis and Visualization of Network Data.	Commercial software

Table 7. Diverse learning analytics tools (continued)

Tools name		Analysis object	Function	license
learning content analysis	Wmatrix	Text	Wmatrix is a software tool for corpus analysis and comparison. It provides a web interface to the English USAS and CLAWS corpus annotation tools, and standard corpus linguistic methodologies such as frequency lists and concordances. It also extends the keywords method to key grammatical categories and key semantic domains.	Free to members of Lancaster University. Free one-month trial is available for individual academic users.
	CATPAC	Text	Catpac is a computer program that analyzes text samples to identify key concepts contained within the sample.	Commercial software
	LIWC	Text	LIWC (Linguistic Inquiry and Word Count) is a text analysis program, It calculates the degree to which various categories of words are used in a text, and can process texts ranging from e-mails to speeches, poems and transcribe natural language in either plain text or Word formats.	Commercial software
Learning ability analysis	ELLIment	The learner's reflective process of learning	The ELLIment research prototype is a working online tool which aims to support mentors and mentees with a reflection on their dispositions for lifelong learning.	
	EnquiryBlogger	Learner's learning progress	EnquiryBlogger extends WordPress, the world's most popular open source content management system and blogging platform, with a set of plugins that turn it into a particular flavour of a social learning journal.	Free&Open source
	Socrato	Learner's test results and learner's strengths and weaknesses	Socrato brings test preparation materials online so they can be distributed and used more effectively.	Commercial software

Table 7. Diverse learning analytics tools (continued)

Tools name		Analysis object	Function	license
learning behavior analysis	Google Analytics	Website activity of users	Google Analytics is a web analytics service offered by Google that tracks and reports website traffic, currently as a platform inside the Google Marketing Platform brand.	Commercial software
	Mixpanel	Website activity of users	Mixpanel is a business analytics service company. It tracks user interactions with web and mobile applications and provides tools for targeted communication with them.	Commercial software
Comprehensive analysis	WEKA	Large-scale data	Weka contains a collection of visualization tools and algorithms for data analysis and predictive modeling, together with graphical user interfaces for easy access to these functions.	Free&Open source
	SPSS	Social research data	SPSS is a powerful statistical software platform.	Commercial software
	SSAS	Multi-dimension data set	Analysis Services is an analytical data engine used in decision support and business analytics. It provides enterprise-grade semantic data models for business reports and client applications such as Power BI, Excel, Reporting Services reports, and other data visualization tools.	Commercial software



Tip 28. Three strategies to turn learning analytics into actionable outcomes

- **Make data transparent and easy to analyse.** Because learning analytics needs to pool and gather the data of students' learning, teachers should use a single LMS or ensure the data on multiple LMS can be interconnected.
- **Close the loop.** Some institutions that use learning analytics get off to a strong start with it, but they stop there by only collecting data. Effective learning analytics is a cyclical process. It should pay attention to the deep mining of data: through data inference and analysis, evaluate students' cognitive conditions, learning styles and preferences, learning process and status. (SEAtS Software, 2020)
- **Exert effective intervention.** Analytics can be used by lecturers and tutors to monitor the performance of their students while the module is taking place; they can then adapt their teaching if, for example, they identify that students are struggling. It is also important to make the intervention personalized and timely. Much intervention can be automated in many learning management systems, for example, by providing student dashboards that report up-to-date performance indicators so that learners can self-regulate their own learning experiences and make necessary adjustments on their own. (Yupangco, 2017)

5.2.7 AI assisted assessment

The use of artificial intelligence to evaluate is mainly to sort out the rules for teachers to appraise student assignments, establish an evaluation model, and design and develop an evaluation system, which is used to grade the students' homework. These techniques can be applied to the evaluation of writing assignments, mathematical problem solving, computer programming, etc. The advantage of artificial intelligence assessment is to reduce the teacher's work intensity and improve work efficiency. The consistency of the score results is high, which provides students with instant feedback. (teachingcommons.stanford.edu, 2020a; Williamson, 2010)

Focus on inference from Artificial Intelligence Assessment. Today, AI assessment is most useful as one part of an assessment process and for enhancing learning, rather than making final, authoritative, high-stakes decisions about student performance. It can furnish teaching staff with better information on the quality of the educational content and activities they are providing, and on their teaching and assessment processes, to enable its continual enhancement. (Zhang, 2013)



Story 26. Combine the power of AI with the experience of examiners

Cambridge University provides exams and qualifications for international students of English, and it has long recognized that integrating artificial intelligence into their exam processes. Products and services are part of the solution to the challenges of demand and expectation, including giving detailed diagnostic feedback to inform students' future language progression.

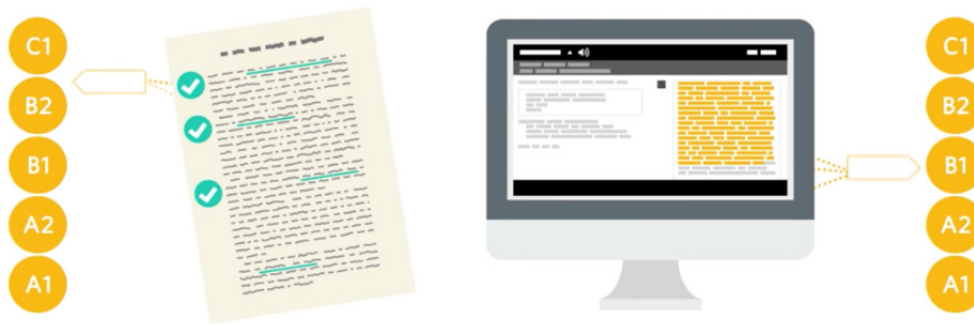


Figure 22. Combine the power of AI with the experience of examiners

It created two auto-markers for writing and speaking tests—both are based on AI technologies driven by big data, which is underpinned by the experience, expertise, and judgment of examiners. In the Linguaskill Writing test that is supported by the auto-marker technology, candidates input answers using a computer keyboard and their answers are automatically marked by the computer.

Source : <https://www.cambridgeenglish.org/exams-and-tests/linguaskill/information-about-the-test>

Conclusion

UNESCO stated that, as of 16 April, school closures in many countries worldwide during the spread of COVID-19 mean that 1,575,270,054 learners are being excluded from the normal learning process. For university teachers, they have to stay at home and give lectures via the Internet, which may cause some challenges for some teachers, especially for those who are not prepared nor familiar with the methods of integrating technology into education. Some universities are using the old-fashioned model of lectures for passive audiences, which failed to equip students to work with emerging technologies. At this critical moment, it is a good opportunity for rethinking teaching and learning, and leverage technology to transform the old-fashioned models for preparing students for the future.

In order to facilitate teachers in conducting flexible instruction to ensure the quality of learning at this critical moment, the guidance has identified some academic terms, guidelines, tips, and stories for teachers, summarized as:

- (a) Making flexible lesson plans and learning activities. The traditional classroom effective teaching methods and the principles of technology-enhanced learning should be considered to deliver online instruction. The flexibility of blended learning should be understood and the blended learning strategies should be employed. It is important to design learning activities and implement the design by considering the characteristics of online or blended learning environments.
- (b) Delivering instruction in diverse technology-enhanced ways. You should be aware that different technology-enhanced delivery methods may suit different learning content and learning scenarios. Normally, the webcast in education for some difficult content, learning with MOOCs for the student's self-directed learning skills, flipped instruction for enhancing the higher-order thinking skills, group learning for students' collaborative and communication skills, and joint online course for meriting the advantages of different universities.
- (c) Adopting abundant digital resources and appropriate tools for learning. There are lots of exiting open educational resources for different subjects, and it is important to choose the most suitable ones by considering licensing, accuracy, interactivity, ease of adaptability, and cultural relevance and sensibility. Multiple tools for the live class, instant message and social networking, concept-mapping and mind-mapping,

and collaborative authoring are available, and they should be adopted based on the learning scenario and learning activities.

- (d) Designing learning activities to promote interaction, enhance engagement and improve motivation. Interaction is the core of remote teaching, and is the basis for the reintegration of teaching and learning activities, which could be promoted by lectures via webinar, online discussion, project-based learning, online debate, brainstorming, experiential learning with virtual space, gamifying learning, etc. Students' motivation and engagement should be enhanced by instant feedback, scaffolding, applying Q&A with AI, etc.
- (e) Evaluating the learning process and outcome in appropriate ways. Multiple assessment tools could be used for evaluation, such as online examination, rubrics, self-checklist, learning contract, e-portfolio, learning analytics, and AI assisted assessment, and it is critical to utilize these tools for the targeted learning objectives.

The above suggestions are not just for addressing the critical moment of the current campus closures. This is a unique opportunity to consider the transformation of teaching and learning for higher education in such a period and grasp the opportunity to infuse technology into higher education. The following implications are provided for promoting higher education in a sustainable way for a long term.

- (a) Rethinking higher education. Higher education is one of the key drivers of growth performance, prosperity, and competitiveness, and plays important roles in sustainable economic and social development, including creating a quality workforce, supporting business and industry, and carrying out research and promoting technologies. During campus closures, the courses are provided through live broadcasting, clip videos, and open resources, which are affordable to everyone and cost-effective. The Internet has become a major tool for effective teaching as well as a learning tool and has allowed students to be in constant touch with their teachers or with other fellow classmates with the help of social media, messaging apps, and chat forums. It is time to rethink the issues of digital campus, information literacy, digital governance, learning experience, teaching reform, and support services in higher education.
- (b) Changing the roles of educators. Colleges and universities are creatively using new technologies to help educators change their teaching methods in order to cope with the great changes brought about by sudden emergencies. Teachers are increasingly expected to employ a variety of technology-based tools and engage in online discussions and collaborative authoring, leverage active learning methodologies like the project and problem-based learning. With learning shifting towards being more in the control of the students, educators are now acting as guides and facilitators.

- (c) Integrating formal and informal learning. Colleges and universities try to adopt flexible teaching programs that provide credit for prior learning, multi-form courses, and extracurricular experience. Through the identification of learning outcomes and the value of these experiences, the school recognizes that informal learning helps to promote students' and faculty's pursuit of lifelong learning and stimulates interest in "self-directed learning" and "curious learning."
- (d) Bridging the achievement gap of students. Achievement gaps reflect differences in enrolment and academic achievement between student groups, however from an international perspective, they are closely related to factors such as family, socio-economic status, race or gender of the student group. The new generation of information technology makes it easier for students of all groups to access learning resources and cognitive tools. In addition, the strategy of online education or hybrid learning enhances support services for personalized and adaptive learning, changing the "one size fits all" approach to traditional higher education paradigms.
- (e) Transforming pedagogy through new technology. Although the development and application of technology offer potential possibilities to improve the "quality of learning" in universities, it is tricky for scholars who are "stuck in existing organizations and immersed in the current state." With the rapid upgrading of technology, educational means often struggle to keep pace with the times. In the current epidemic stage, colleges and universities are trying to optimize the digital campus to ensure the selected technologies and tools could be used to deepen the learning outcome in quantitative ways. With technology integrated into the instructional design process, the practice could enhance the teaching and learning experience, so that teachers can "efficiently and pragmatically" use information technology to reform teaching.

References

- Al-Samarraie, H., Shamsuddin, A., & Alzahrani, A. I. (2019). A flipped classroom model in higher education: a review of the evidence across disciplines. *Educational Technology Research and Development*, 1-35.
- Al-Zahrani, A. M. (2015). From passive to active: The impact of the flipped classroom through social learning platforms on higher education students' creative thinking. *British Journal of Educational Technology*, 46(6), 1133–1148.
- Allan, J. (1996). Learning outcomes in higher education. *Studies in higher education*, 21(1), 93-108.
- Allen, I.E., Seaman, J., & Garrett, R. (2007). *Blending In: The Extent and Promise of Blended Education in the United States*. Sloan Consortium.
- Anderson, T. (2008). *The Theory and Practice of Online Learning* (2nd Edition). Albert: Athabasca University Press.
- Anderson, T., Rourke, L., Garrison, D. R., Archer, W. (2001). Assessing Teaching presence in a Computer Conference Environment. *Journal of asynchronous learning networks*, 5(2), 1-17.
- Ansari, A., Maknoja, M., & Shaikh, A. (2016, March). Intelligent question answering system based on artificial neural network. In *2016 IEEE International Conference on Engineering and Technology (ICETECH)* (pp. 758-763). IEEE.
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, 52(1), 1–26.
- Banta, T. W. (2003). *Introduction: Why portfolios? Portfolio assessment: Uses, cases, scoring, and impact*. San Francisco, CA: Jossey-Bass.
- Barrett, H. (2008). Balancing “eportfolio as test” with “eportfolio as story.” Presented at Making Connections conference.
- Basken, P. (2008, April). Electronic portfolios may answer calls for more accountability. *Chronicle of Higher Education*, 54(32), A30-A31.
- Bass, R. & Eynon, B. (2009). Capturing the visible evidence of invisible learning. The Academic Commons.
- Bates, A. W. (2018). *Teaching in a digital age. Guidelines for designing teaching and learning for a digital age*. Tony Bates Associates Ltd.
- Becker, A. (2011). Examining Rubrics Used to Measure Writing Performance in US Intensive English Programs. *CATESOL Journal*, 22(1), 113-130.

- Berge, Z. L.(1995).Facilitating computer conferencing: recommendations from the field. *Educational Technology*,35(1): 22-30.
- Berrett, D. (2012). How “flipping” the classroom can improve the traditional lecture. *The chronicle of higher education*, 12(19), 1-3.
- Biggs, J. (1999). Formulating and clarifying curriculum objectives. In J.B. Biggs, *Teaching for quality learning at university: what the student does*(pp.33-53). Buckingham, UK: SRHE and Open University Press.
- Bishop, J.L., & Verleger, M.A. (2013). The flipped classroom: A survey of the reaserch. Paper presented at the ASEE National Conference Proceedings, Atlanta, GA. p.5
- Blumenfeld, P.C., Soloway, E., Marx, R.W., Krajcik, J.S., Guzdial, M., & Palincsar, A. (1991). Motivating project-based learning: Sustaining the doing, supporting the learning. *Educational Psychologist*, 26(3&4), 369-398.
- Borich, G. D. (2014). *Effective teaching methods: research-based practice*(8th edition). Pearson Schweiz Ag.
- British Columbia Institute of Technology. (2020). Developing Checklists and Rating Scales. Retrieved from http://www.northernc.on.ca/leid/docs/ja_developchecklists.pdf
- Brown, B., Schroeder, M., & Eaton, S. E. (2016). Designing Synchronous Online Interactions and Discussions. In M. A. Takeuchi, A. P. Preciado Babb, & J. Lock (Eds.). *Proceedings of the IDEAS: Designing for Innovation*(pp. 51-60). Calgary, Canada: University of Calgary.
- Bruff, D.O. ,Fisher, D.H., McEwen, K.E., & Smith, B.E.(2013). Wrapping a MOOC: Student perceptions of an experiment in blended learning. *Journal of Online Learning and Teaching*, 9(2) :187 -199.
- Burkitt, E. (2006). Zone of proximal development. In G. Davey, *Encyclopaedic dictionary of psychology*. London : Hodder Arnold.
- Casey, J., & Wilson, P. (2005). *A practical guide to providing flexible learning in further and higher education*. Retrieved from <http://qmwww.enhancementthemes.ac.uk/docs/publications/a-practical-guide-to-providing-flexible-learning-in-further-and-higher-education.pdf>
- Capsim. (2020). *Implementing project-based learning in online classrooms*. Retrieved from <https://www.capsim.com/blog/implementing-project-based-learning-in-online-classrooms/>.
- Chaiklin, S. (2003). The zone of proximal development in Vygotsky’s theory of learning and school instruction. In A. Kozulin, B. Gindis, V.S. Ageyev, & S.M. Miller(Eds.), *Vygotsky’s educational theory in cultural context* (pp.39-64). Cambridge: Cambridge University Press.
- Collis, B. & Moonen, J. (2004). *Flexible Learning in a Digital World* (2nd edition), London: Routledge and Falmer
- Collis, B., Moonen, J., & Vingerhoets, J. (1997), Flexibility as a Key Construct in European Training:

Experiences from the TeleScopia Project. *British Journal of Educational Technology*, 28: 199-217.
doi:10.1111/1467-8535.00026

Collison, G., Elbaum, B., Haavind, S., & Tinker, R. (2000). *Facilitating online learning: Effective strategies for moderators*. Atwood Publishing, 2710 Atwood Ave., Madison, WI 53704.

Communication Technologies: Promoting Active Online Learners (2020). https://www.educationworld.com/a_tech/active-online-learning-communication-tools.shtml

Concept Maps: What the heck is this? (2020). <https://msu.edu/~luckie/ctools/>

Corwin Press. Xie, Y.R., Qiu, Y., Huang, Y.L., & Wang, Q.L. (2020). Characteristics, Problems and Innovations of Online Teaching of "No Suspension of Classes" during the Period of Epidemic Prevention and Control. *e-Education Research*, 41(03):20-28.

Danker, B. (2015). Using flipped classroom approach to explore deep learning in large classrooms. *IAFOR Journal of Education*, 3(1), 171-186.

Davidson, N., & Major, C. H. (2014). Boundary crossings: Cooperative learning, collaborative learning, and problem-based learning. *Journal on Excellence in College Teaching*, 25(3&4), 7-55.

de Jong, P., Pickering, J., Hendriks, R., Swinnerton, B., Goshtasbpour, F. and Reinders, M. (2019). Twelve tips for integrating massive open online course content into classroom teaching. *Medical Teacher*, 42(4), pp.393-397.

Denis, B., Watland, P., Pirotte, S., & Verday, N. (2004, April). Roles and competencies of the e-tutor. In *Networked learning 2004: a research based conference on networked learning and lifelong learning: proceedings of the fourth international conference*, Lancaster (pp. 150-157).

Entwistle, N., & Karagiannopoulou, E. (2014). Perceptions of Assessment and their Influences on Learning. *Advances and Innovations in University Assessment and Feedback*, 75-98.

Envoplan. (2020). Leading A New Generation-Self Directed Learning. Retrieved from <https://envoplan.co.uk/education-news/leading-a-new-generation-self-directed-learning>.

Epigeum. (2019). What do we mean by 'digital learning resources'? Retrieved from https://flexiblelearning.auckland.ac.nz/learning_technologies_online/6/1/html/course_fles/1_1.html

Esson, J. M. (2016). Flipping general and analytical chemistry at a primarily undergraduate institution. In *The flipped classroom Volume 2: Results from practice* (pp. 107-125). Washington, DC: ACS Publications.

Evseeva, A., & Solozhenko, A. (2015). Use of flipped classroom technology in language learning. *Procedia-Social and Behavioral Sciences*, 206, 205-209.

Faculty Innovation Center of The University of Texas at Austin (December 3, 2019), Group learning. Retrieved from <https://facultyinnovate.utexas.edu/group-learning>

- Ferreira, J. M., Sousa, E., Nafalski, A., Machotka, J., & Nedic, Z. (2009). Collaborative learning based on a micro-webserver remote test controller. Retrieved from <https://repositorio-aberto.up.pt/bitstream/10216/84637/2/59169.pdf>
- Festinger, L. (1957). *A theory of cognitive dissonance*. Stanford: Stanford University Press.
- Garrison, D., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, 2, 87-105.
- Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *American Journal of distance education*, 15(1), 7-23.
- Garrison, D.R. & Arbaugh, J.B. (2007). Researching the community of inquiry framework: Review, issues, and future directions. *The Internet and Higher Education*, 10(3), 157-172.
- Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education*, 7, 95-105.
- Gerosa, M. A., Filippo, D., Pimentel, M., Fuks, H., & Lucena, C. J. (2010). Is the unfolding of the group discussion off-pattern? Improving coordination support in educational forums using mobile devices. *Computers & Education*, 54(2), 528-544.
- Goldberg, H. R., Haase, E., Shoukas, A., & Schramm, L. (2006). Redefining classroom instruction. *Advances in physiology education*, 30(3), 124-127.
- Gordon, N. A. (2014). Flexible Pedagogies: technology-enhanced learning. In *The Higher Education Academy*. <https://doi.org/10.13140/2.1.2052.5760>
- Haag, S. (1990). *Teaching at a Distance, Techniques for Tutors*. Waterloo: University of Waterloo.
- Hawkes, M. (2006). Linguistic discourse variables as indicators of reflective online interaction. *The American Journal of Distance Education*, 20(4), 231-244.
- Haythornthwaite, C., & Kazmer, M.M. (2002). Bringing the Internet home. *The Internet in everyday life*, 431.
- Hergueux, J., & Jacquemet, N. (2015). Social preferences in the online laboratory: a randomized experiment. *Experimental Economics*, 18(2), 251-283.
- Hicks, M. J. (2004). *Problem solving and decision making: hard, soft and creative approaches*. Cengage Learning EMEA.
- Hrastinski, S. (2008). The potential of synchronous communication to enhance participation in online discussions: A case study of two e-learning courses. *Information & Management*, 45(7), 499-506.
- Huang, R.H., Liu, D.J., Amelina, N., Yang, J.F., Zhuang, R.X., Chang, T.W., & Cheng, W. (2020a). *Guidance on Active Learning at Home during Educational Disruption: Promoting student's self-regulation skills in COVID-19 outbreak*. Beijing: Smart Learning Institute of Beijing Normal University

- Huang, R.H., Liu, D.J., Tlili, A., Gao, Y., & Koper, G.(ed.) (2020). *Current State of Open Educational Resources in the “Belt and Road” Countries*. Springer Singapore.
- Huang, R.H., Liu, D.J., Tlili, A., Yang, J.F., Wang, H.H., et al. (2020b). *Handbook on Facilitating Flexible Learning During Educational Disruption: The Chinese experience in Maintaining Undisrupted Learning in COVID-19 outbreak*. Beijing: Smart Learning Institute of Beijing Normal University.
- Huang, R.H., Liu, D.J., Zhan, T., Tlili, A., Knyazeva, S., Chang, T. W., Zhang, X.L., Burgos, D., & Zhang, M.H. (2020c). *Guidance on Open Educational Practices during School Closures: Utilizing OER in COVID-19 Outbreak in line with UNESCO Recommendations*. Beijing: Smart Learning Institute of Beijing Normal University. (In press)
- Huang, R.H., Spector, J. M., & Yang, J.F. (2019). *Educational Technology:a primre for 21st century*. Springer Nature Singapore Pte Ltd.
- Hung, H.T. (2015). Flipping the classroom for english language learners to foster active learning. *Computer Assisted Language Learning*, 28(1), 81–96.
- Irish Department of Education and Skills. (2020). Checklists. Retrieved from <http://schoolself-evaluation.ie/primary/resources/gathering-evidence/checklists/>.
- Jeong, J. S., Gonz ā lez-G ĩ mez, D., & Ca ada-Ca ada, F. (2016). Students’ perceptions and emotions toward learning in a flipped general science classroom. *Journal of Science Education and Technology*, 25(5), 747–758.
- Johnson, D. W., & Johnson, R. T. (2013). The impact of cooperative, competitive, and individualistic learning environments on achievement. In J. Hattie & E. Anderman (Eds.), *International handbook of student achievement* (pp.372-374). New York: Routledge.
- Johnson, D. W., & Johnson, R. T. (2017). Cooperative learning. Retrieved from http://ecoasturias.com/images/PDF/ponencia_zaragoza_David_Johnson.pdf
- Kaplan, A.M.,& Haenlein, M. (2016). Higher education and the digital revolution: About MOOCs, SPOCs, social media, and the Cookie Monster. *Business Horizons*, 59 (4): 441–50.
- Kaur, S.(2017). Collaborative authoring tools: All you want to know!. <https://elearningindustry.com/collaborative-authoring-tools-all-want-know>
- Kayler, M., & Weller, K. (2007). Pedagogy, self-assessment, and online discussion groups. *Journal of Educational Technology & Society*, 10(1), 136-147.
- Kim, G. J., Patrick, E. E., Srivastava, R., & Law, M. E. (2014). Perspective on flipping circuits I. *IEEE Transactions on Education*, 57(3), 188-192.
- Krajcik, J. S., & Blumenfeld, P. C. (2006). Project-based learning (pp. 317-34). na. In R.K. Sawyer (ed). *The Cambridge Handbook of the Learning Sciences* (pp. 317-334). Cambridge University Press.
- Kuh, G. D., Kinzie, J., Schuh, J. H., & Whitt, E. J. (2005). *Assessing conditions to enhance educational*

effectiveness. San Francisco: Jossey-Bass.

Larmer, J. (April 21, 2015). Gold Standard PBL: Essential Project Design Elements. Retrieved from <https://www.pblworks.org/blog/gold-standard-pbl-essential-project-design-elements>

Larmer, J., Mergendoller, J., & Boss, S. (2015). *Setting the standard for project based learning*. ASCD.

Learn About Concept Maps(2020). <https://cmap.ihmc.us/>

Lentell , H.(2003).The Importance of the Tutor in Open and Distance Learning. In A. Tait, & R. Mills. *Rethinking Learner Support In Distance Education*. London: Routledge Falmer, 64-76.

Liu, G., Zhang, Y., & Fan, H. (2013). Design and development of collaborative learning platform supporting flipped classroom. *World Transactions on Engagement And Technology Education*, 11(2) 82-87.

Liu, J.(2017). “Live + Education” : A New Form of “Internet Plus” Learning and Its Value Inquiry. *Journal of Distance Education*,35(01):52-59.

Lundin, R. (1999) Flexible Teaching and Learning: Perspectives and Practices, *UniServe Science News* Volume 13.

Masson, M. (December 2014). Benefits of TED Talks. *Canadian Family Physician*, 60 (12): 1080.

Mattis, K.V.(2015). Flipped Classroom Versus Traditional Textbook Instruction: Assessing Accuracy and Mental Effort at Different Levels of Mathematical Complexity.*Tech Know Learn*, 20, 231–248.

McGreal, R. (2011). Open educational resource repositories: an analysis. The 3rd Annual Forum on e-Learning Excellence, Dubai, UAE, Dubai, [online] Retrieve from <http://elexforum.hbmeu.ac.ae/Proceeding/PDF/OpenEducationalResource.pdf>

McMeekin, A. (1998) Flexible Learning and Teaching and IT, Keynote address to the 1998 Monash University Flexible Learning and Technology Conference, 1 October 1998.

Merrill, M. D., Drake, L., Lacy, M. J., Pratt, J., & ID Research Group. (1996). Reclaiming instructional design. *Educational Technology*, 36(5),5-7 .

Miles, P. (1998). *Internet World Guide to Webcasting*. New York: Wiley.

Mok, H. N. (2014). Teaching tip: The flipped classroom. *Journal of Information Systems Education*, 25 (1), 7-11

Moreno-Ger, P., Burgos, D., Martínez-Ortiz, I., Sierra, J. L., & Fernández-Manjón, B. (2008). Educational game design for online education. *Computers in Human Behavior*, 24(6), 2530-2540.

Ni, J.J.,& Ding, S.L.(2017). O2O Live Classroom Teaching Model and Its Practice. *China Educational Technology*, (11):114-118.

Nouri, J. (2016). The flipped classroom: For active, effective and increased learning—especially for low

achievers. *International Journal of Educational Technology in Higher Education*, 13(1), 1–10.

Open educational resources(2020, March 19). Retrieved from https://en.wikipedia.org/wiki/Open_educational_resources

O' Rourke, J. (2012). Tutoring in Open and Distance Learning: A Handbook for Tutors. Retrieved from [http://www.unisa.ac.za/contents/courses/docs/Tutoring in ODL_CoL.pdf](http://www.unisa.ac.za/contents/courses/docs/Tutoring_in_ODL_CoL.pdf),2012-06-13.

Ozdemir, O., Bonk, C. J.(2017). Turkish Teachers' Awareness and Perceptions of Open Educational Resources. *Journal of Learning for Development*, v4 n3 p307-321

Paulson, P. R., & Paulson, F. L. (1991, March). Portfolios: Stories of knowing. Paper presented at the 54th annual meeting of the Claremont Reading Conference (No. ED377209).

Peterson, D. J. (2016). The flipped classroom improves student achievement and course satisfaction in a statistics course: A quasi-experimental study. *Teaching of Psychology*, 43(1), 10–15.

Phillips, C. R., & Trainor, J. E. (2014). Millennial students and the flipped classroom. *Journal of Business and Educational Leadership*, 5(1), 102.

Piaget, J. (1975). *The equilibration of cognitive structure*. Chicago, IL: University of Chicago Press.

Project-Based Learning(2020). <https://teachingcommons.stanford.edu/resources/learning/learning-activities/project-based-learning>

Project-Based Learning: Teaching Guide(2020). <http://www.bu.edu/ctl/guides/project-based-learning/>

Rainbow, C.(2020). Supporting every teacher: using a video conference platform for teaching online. Retrieved from <https://www.cambridge.org/elt/blog/2020/03/16/using-video-conference-platform-teaching-online/>

Roberts, T. S., & McInerney, J. M. (2007). Seven Problems of Online Group Learning (and Their Solutions). *Educational Technology & Society*, 10 (4), 257-268.

Roehl, A., Reddy, S. H., & Shannon, G. J. (2013). The flipped classroom: An opportunity to engage millennial students through active learning strategies. *Journal of Family and Consumer Sciences*, 105(2), 44–49.

Rourke, L., Anderson, T. Garrison, D. R., & Archer, W. (2001). Assessing social presence in asynchronous, text-based computer conferencing. *Journal of Distance Education*, 14(3), 51-70.

Rowlands, K. D. (2007). Check it out! Using checklists to support student learning. *English Journal*, 61-66.

Sachs, E. (2018). Guided Discovery as a Teaching Method. Public Lecture, MIT Campus.Sauer, A.J., "The transition of flipped instruction: from professional development to classroom"(2016). Graduate Research Papers. 698.

- Sands, P. (2002.) Inside outside, upside downside: Strategies for connecting online and face-to-face instruction in hybrid courses. *Teaching with Technology Today*, 8(6).
- Sankar, S. (2012).The rise of Human-Computer Cooperation. Speech, TEDGlobal.
- Sawyer, R. K. (Ed.). (2005). *The Cambridge handbook of the learning sciences*. Cambridge University Press.
- Scardamalia, M., & Bereiter, C. (2003). Knowledge Building. In J. W. Guthrie (Ed.), *Encyclopedia of Education*(2nd edition). New York: Macmillan Reference, USA
- Schwab, M., Strobel, H., Tompkin, J., Fredericks, C., Huff, C., Higgins, D., ... & Pfister, H. (2016). booc.io: An education system with hierarchical concept maps and dynamic non-linear learning plans. *IEEE transactions on visualization and computer graphics*, 23(1), 571-580.
- SEAtS Software. (2020). The Importance of Learning Analytics for Universities and Students. Retrieved from https://www.seatssoftware.com/wp-content/uploads/2017/09/SEAtS_ImportanceofLearningAnalytics_N.pdf
- Siemens, G., Dawson, S., & Lynch, G. (2013). Improving the quality and productivity of the higher education sector-Policy and Strategy for Systems-Level Deployment of Learning Analytics. Canberra, Australia: Society for Learning Analytics Research for the Australian Office for Learning and Teaching.
- Singh, V., & Thurman, A. (2019). How Many Ways Can We Define Online Learning? A Systematic Literature Review of Definitions of Online Learning (1988-2018). *American Journal of Distance Education*, 33(4): 289-306. <https://doi.org/10.1080/08923647.2019.1663082>.
- Society for Learning Analytics Research (SoLAR). (2020). What is Learning Analytics? Retrieved from <https://www.solaresearch.org/about/what-is-learning-analytics/>.
- Soult, A. S. (2016). Experiences in flipping a large lecture course for general, organic, and biological chemistry. In *The flipped classroom Volume 1: Background and challenges*(pp. 135-145). Washington,DC: ACS Publications.
- Staker, H., & Horn, M.B. (2012). *Classifying K-12 Blended Learning*. Boston: Innosight Institute.
- Strain, K.(2020). Webcasting for Higher Education. Retrieved from <https://www.pgi.com/blog/2020/03/webcasting-for-higher-education/>
- Squire, K., & Jenkins, H. (2003). Harnessing the power of games in education. *Insight*, 3(1), 5-33.
- teachingcommons.stanford.edu (2020a). Artificial Intelligence Assessment. Retrieved from <https://teachingcommons.stanford.edu/resources/teaching/evaluating-students/assessing-student-learning/artificial-intelligence-assessment>.
- Teachingcommons.stanford.edu. (2020b). Rubric Design. Retrieved from <https://teachingcommons.stanford.edu/teachingwriting/teaching/teaching-writing-major/writing-assessment-overview/rubric-design>.

- Teaching.berkeley.edu. (2020). e-Portfolio. Retrieved from <https://teaching.berkeley.edu/resources/assessment-and-evaluation/design-assessment/e-portfolio>.
- Tlili, A., Huang, R.H., Chang, T.W., Nascimbeni, F., Burgos, D.(2019). Open Educational Resources and Practices in China: A Systematic Literature Review. *Sustainability*, 11, 4867; doi:10.3390/su11184867.
- Tosh, D., Light, T., Fleming, K., & Haywood, J. (2005). Engagement with electronic portfolios: Challenges from the student perspective. *Canadian Journal of Learning and Technology/La revue canadienne de l' apprentissage et de la technologie*, 31(3).
- Tucker, C. R. (2012). *Blended learning in grades 4–12: Leveraging the power of technology to create student-centered classrooms*. Thousand Oaks, CA: Corwin.
- Tyler, R. W. (1971). Some persistent questions on the defining of objectives. In M.B. Kapfer(ed.) *Behavioral Objectives in Curriculum Development*(pp.139-147). Englewood Cliffs, New Jersey: Educational Technology Publications.
- Ucdoer.ie. (2020). Learning Contracts. Retrieved from http://www.ucdoer.ie/index.php/Learning_Contracts.
- UCLA (2016). Learning Outcome vs. Learning Objective. Retrieved from <https://www.uclahealth.org/nursing/workfiles/Education%20Courses/ContinuingEducation/ce-LearningOutcome-v-LearningObjective-052016.pdf>.
- U.S. Department of Education. (2017). Reimagining the role of technology in education: 2017 national education technology plan update. Retrieved from <http://tech.ed.gov>.
- UNESCO(2019). Recommendation on Open Educational Resources (OER). Retrieved from http://portal.unesco.org/en/ev.php-URL_ID=49556&URL_DO=DO_TOPIC&URL_SECTION=201.html
- UNESCO.(April 16th, 2020). COVID-19 Impact on Education. Retrieved from <https://en.unesco.org/themes/education-emergencies/coronavirus-school-closures>
- Uu.edu. (2020). Qualities of an Effective Examination. Retrieved from <https://www.uu.edu/centers/faculty/teaching/article.cfm?ID=135>.
- Vaughan, M. (2014). Flipping the learning: An investigation into the use of the flipped classroom model inan introductory teaching course. *Education Research and Perspectives* (Online), 41, 25.
- Villa, R. A., Thousand, J. S., & Nevin, A. I. (2013a). *A guide to co-teaching: New lessons and strategies to facilitate student learning* (3rd ed.).Corwin Press.
- Villa, R. A., Thousand, J. S., & Nevin, A. I. (2013b). What Is Co-Teaching? In R. A. Villa, J. S. Thousand, & A. I. Nevin (Eds.), *A guide to co-teaching: New Lessons and Strategies to Facilitate Student Learning* (3rd ed., pp. 1–6). Corwin Press.
- Wästberg, B. S., Eriksson, T., Karlsson, G., Sunnerstam, M., Axelsson, M., & Billger, M. (2019). Design considerations for virtual laboratories: A comparative study of two virtual laboratories for learning

about gas solubility and colour appearance. *Education and Information Technologies*, 24(3), 2059-2080.

White, E. M. (1985). Teaching and Assessing Writing: Recent Advances in Understanding, Evaluating, and Improving Student Performance. In *The Jossey-Bass Higher Education Series*. Jossey-Bass Publishers, 433 California St., Suite 1000, San Francisco, CA 94104-2091.

Wiki(n.d.a). Cooperative_learning. Retrieved from https://en.wikipedia.org/wiki/Cooperative_learning

Wiki(n.d.b). Massive open online course. Retrieved from https://en.wikipedia.org/wiki/Massive_open_online_course

Williamson, D.M., et al. (July 2010) Automated Scoring for Assessment of Common Core Standards, Educational Testing Service.

Wu,Y.(2020) Respond to crises, turn crises into opportunities, take the initiative to change, and build an international online teaching platform and curriculum resources[Powerpoint slides].Video Conference on the Construction of Online Teaching International Platform Courses in Universities. [2020-04-10]

Yestrebsky, C. L. (2016). Direct comparison of flipping in the large lecture environment. In *The flipped classroom Volume 2: Results from practice* (pp. 1-18). Washington, DC: ACS Publications.

Yin, R. K. (2017). *Case study research and applications: Design and methods*. Sage publications.

Yupangco, J. (2017). 3 Tips to Turn Learning Analytics into Actionable Outcomes [Blog]. Retrieved from <https://elearningindustry.com/turn-learning-analytics-into-actionable-outcomes-3-tips>.

Zhan, Z. H., Zhang, J., Shi, Y. H., & Liu, H. L. (2012, June). A modified brain storm optimization. In *2012 IEEE Congress on Evolutionary Computation* (pp. 1-8). IEEE

Zhang, M. (March 2013) Contrasting Automated and Human Scoring of Essays. *R&D Connections*, n21. Educational Testing Service

7. Professional Online Lectures (2020). Retrieved from <https://courses.lumenlearning.com/virtuallearningdesigndelivery/chapter/7-professional-online-lectures/>.

Participant list

Project Members

Ronghuai Huang, Professor of Faculty of Education, Beijing Normal University, and Co-Dean of Smart Learning Institute of Beijing Normal University

Dejian Liu, Founder and Chairman of NetDragon Websoft Holdings Limited and Co-Dean of Smart Learning Institute of Beijing Normal University

Tao Zhan, Director, UNESCO IITE

Ming Li, Professor, Southern University of Science and Technology, China Director, UNESCO ICHEI

Svetlana Knyazeva, Senior National Project Officer in Education, Chief of Unit “Digital Pedagogy and Learning Materials”, UNESCO IITE

Jianhua Zhao, Professor, Southern University of Science and Technology, China Senior Expert, UNESCO ICHEI

Chee-Kit Looi, Professor, Centre for Research and Development in Learning, Nanyang Technological University, Singapore

Jiong Guo, Professor, College of Educational Technology, North West Normal University

Junfeng Yang, Professor, College Of Education, Hangzhou Normal University

Xuefeng Wei, Professor, College of Teacher Education, Ludong University

Rongxia Zhuang, Associate Professor, Faculty of Education, Beijing Normal University

Ting-Wen Chang, Assistant to the Dean, Smart Learning Institute of Beijing Normal University

Zhiying Nian, Senior Education Research Officer, Smart Learning Institute of Beijing Normal University

Bojun Gao, Master Student, Faculty of Education, Beijing Normal University

Zhisheng Li, Project Assistant, Smart Learning Institute of Beijing Normal University

Qian Cheng, Project Assistant, Smart Learning Institute of Beijing Normal University

Global Contributors (Names are presented below in the alphabetical order)

Chris Dede, Professor, Harvard University, U.S.A.

Isak Froumin, Professor, National Research University Higher School of Economics, Russia

Kampe Hayashi, Associate Professor, Shinshu University, Japan

Wayne Holmes, Assistant Professor, The Open University, U.K.

Mohamed Jemni, Director of ICT Department, ALECSO

Kinshuk, Professor, University of North Texas, U.S.A; President, IASLE

Svetlana Knyazeva, Senior National Project Officer in Education, UNESCO IITE

Diana Laurillard, Professor, UCL Institute of Education, U.K.

Cher Ping Lim, Professor, The Education University of Hong Kong, China

David McConnell, Professor, Curtin University, Australia



UNESCO International Research and Training Centre for Rural Education (UNESCO INRULED)

UNESCO International Research and Training Centre for Rural Education (UNESCO INRULED) was jointly founded by the Chinese government and UNESCO and located at BNU in 2008. The vision of UNESCO INRULED is to promote social-economic development in rural areas by bringing about positive changes in the thinking and behavior and rural people, who make the majority of the population in developing countries and to achieve the goals of Education for All. UNESCO INRULED has published over 40 publications, including research projects, training modules, magazines as well as newsletters. UNESCO INRULED also has established a wide network of cooperation with UN agencies, development agencies, non-governmental organizations, foundations and closed links with UNESCO institutions and centers.



International Centre for Higher Education Innovation under the auspices of UNESCO (UNESCO ICHEI)

Located in Shenzhen, China, UNESCO-ICHEI was approved on November 13rd, 2015 by the 38th General Conference of UNESCO. It is the tenth Education Sector UNESCO Category 2 centre in the world and also the first Category 2 centre for higher education in China. Relying on the advantages of Shenzhen's information and communication technology (ICT) sector and drawing upon China's experience with the massification of its higher education, ICHEI aims to meet the local demand for quality higher education resources and to support Asian and African countries to improve the quality of higher education and promote educational equity. With the above aims, ICHEI has been carrying out higher education cooperative projects with countries along the Maritime Silk Road. Through various forms of knowledge sharing and capacity building, ICHEI exports Shenzhen's ICT products and services to the project countries to provide with them intellectual support and human resources for local industrialization and informatization. Meanwhile, ICHEI also conducts research on education in the countries along the Maritime Silk Road, aiming to become an influential educational think-tank and an international higher education platform for information sharing and communication on innovative thoughts and practices.



UNESCO Institute for Information Technologies in Education (UNESCO IITE)

UNESCO Institute for Information Technologies in Education (UNESCO IITE) was established as an integral part of UNESCO by the General Conference of UNESCO at its 29th session (November 1997) and is located in Moscow, Russian Federation. IITE is the only UNESCO category 1 Institute that holds a global mandate for ICT in education. In line with the new Education 2030 Agenda, IITE has developed its strategic priority areas to meet new demands and tasks ahead. The mission of IITE in the new era is promoting the innovative use of ICT and serving as facilitator and enabler for achieving Sustainable Development Goal 4 (SDG 4) through ICT-enabled solutions and best practices.



北京师范大学智慧学习研究院
Smart Learning Institute of Beijing Normal University

Smart Learning Institute of Beijing Normal University (SLIBNU)

Beijing Normal University (BNU) grew out of the Education Department of Imperial University of Peking established in 1902, which initiated teacher training in China's higher education. After the development for over a century, BNU has become a comprehensive and research-intensive university with its main characteristics of basic disciplines in sciences and humanities, teacher education and educational science. Smart Learning Institute (SLI) is jointly established by Beijing Normal University and a global educational technology company NetDragon Websoft. SLI is a comprehensive experimental platform involving scientific research, technology development, and innovative instruction. SLI focuses on detecting learning patterns powered by ICT, creating smart learning environments and platforms for life-long and life-wide learning, as well as supporting diversified, personalized and differential learning needs for digital learners.



**NANYANG
TECHNOLOGICAL
UNIVERSITY**
SINGAPORE

Centre for Research and Development in Learning at Nanyang Technological University, Singapore (CRADLE@NTU)

CRADLE aspires to be a global research hub for empowering and transforming learners in higher education and lifelong learning. Its multi-disciplinary approach fosters interdisciplinary research and seeks to develop a transdisciplinary outcome for the Science of Learning. The Centre embraces interdisciplinary research and leverages knowledge and methods from Education, Psychology, Neuroscience and Technology to foster theories that explain learning in all of its forms. We believe that transformative innovation can happen at the nexus of these different fields. CRADLE serves as an activity and technology incubator for researching and transforming learning in higher education. To achieve these ends, CRADLE engages with learners, professionals, and the teaching community to identify research needs, support development opportunities, and diffuse research outcomes.



International association of smart learning environment (IASLE)

The International association of smart learning environments (IASLE) is a cutting-edge professional forum for researchers, academics, practitioners, and industry professionals interested and/or engaged in the reform of the ways of teaching and learning through advancing current learning environments towards smart learning environments. It provides opportunities for discussions and constructive dialogue among various stakeholders on the limitations of existing learning environments, need for reform, innovative uses of emerging pedagogical approaches and technologies, and sharing and promotion of best practices, leading to the evolution, design and implementation of smart learning environments.



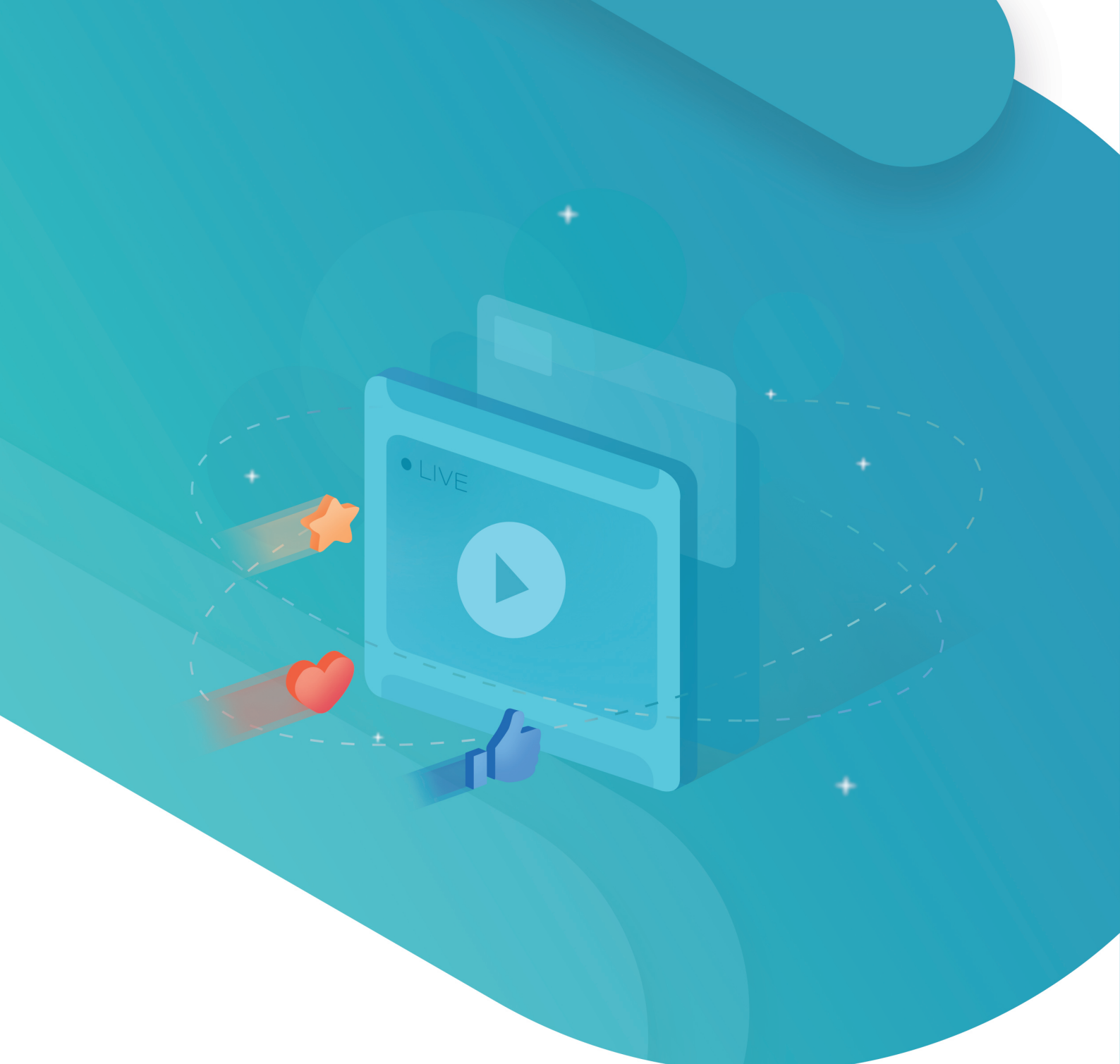
Arab League's Educational, Cultural and Scientific Organization (ALECSO)

Arab League's Educational, Cultural and Scientific Organization (ALECSO) was founded in 1975. Its Documentation and Information Department provides information on all aspects of education including adult education, culture and science in and on Arab countries. Expansion of the documentation services through use of Internet is being planned in order to deepen international contacts and co-operation. The Department of Documentation and Information maintains cooperation and coordination with the Arab countries in the domain of information processing and exchange, in order to guarantee easy flow and high efficiency. This aim also includes the Arabization of information tools consistent with the Arab national ambitions that stress the upgrading of economic and social plans in the Arab region; thus reaching an optimum enrichment of development.



Edmodo

Edmodo is an educational technology company offering a communication, collaboration, and coaching platform to K-12 schools and teachers. The Edmodo network enables teachers to share content, distribute quizzes, assignments, and manage communication with students, colleagues, and parents. Edmodo is very teacher-centric in their design and philosophy: students and parents can only join Edmodo if invited to do so by a teacher. Teachers and students spend large amounts of time on the platform, both in and out of the classroom. Edmodo is free to use, but it also offers premium services.



Website: <http://sli.bnu.edu.cn/en/>

Address: 12F, Block A, Jingshi Technology Building,
No. 12 Xueyuan South Road, Haidian
District, Beijing, China

Email: smartlearning@bnu.edu.cn

Phone: 8610-58807219

Postcode: 100082



[HTTP://SLI.BNU.EDU.CN/EN/](http://sli.bnu.edu.cn/en/)