

Exploring the opportunities and challenges of mainstreaming blended learning in Life Sciences Higher Education

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The term blended learning is generally applied to the practice of using digital resources alongside in-person learning experiences when teaching students. Blended-learning practices and experiences may vary widely in design and execution. The colloquium explored the opportunities and challenges of blended learning in life sciences higher education through institutional, student and lecturer perspectives.

1. Digital technology: developments, lessons learnt and potential usage in the post-Covid era

Although integration of technology into teaching and learning is not new, the rapid rate and pace of technological advancement are having considerable impact across Higher Education. Due to the Covid pandemic, online teaching has become an integral part of education. A wide variety of platforms and tools are nowadays available to support (new) digital forms of education. However, it was stressed by several speakers during the colloquium that although tools, platforms and technology might have changed, the principles of didactics and pedagogy remain important to learning. Educational technology should be used as a well-considered tool, but it will not replace the lecturer in higher education although it might impact the learning environment and the role of the teacher. Several examples were discussed showing how digital technology can be successfully used to support competency-based learning in education.

- It provides opportunities for lecturers to shift from classical knowledge transfer and “front of the class teaching” primarily taking up a role as content expert to a position of coach/supervisor e.g. in utilising project or challenge-based learning approaches engaging students in analyzing and evaluating real-world problems.

- it enables a more active learning strategy e.g. in the use of a flipped classroom approach where students are introduced to content at home at their own pace and on-campus contact with the lecturer can be dedicated to the actual laboratory practice, field work or exercises and Q&A sessions,

- it contributes to a more flexible and individualized learning trajectory in which students participate at their own time and pace for which they do not interact simultaneously with each other or with lecturers (asynchronous learning) e.g. via introduction of particular learning

paths including knowledge clips, assignments (possibly with automated feedback), online tests etc.,

- it facilitates collaborative online international collaboration among students from various institutes (preferably still combined with short physical mobility e.g. an immersion week),
- it enables the introduction of virtual field trips or tours and guest lectures from renowned international experts from science or industry to enrich the learning experience in applied science,
- it provides opportunities for effective and efficient coaching & peer to peer meetings (e.g. internship and bachelor project or master thesis coaching).

Still, studies and experience at several institutes show that many teachers use digital technology in a limited way. It is used primarily to organize online teaching sessions, mostly for delivering information, and sometimes to promote active learning. Nevertheless, some early adopters have managed to effectively integrate digital tools and platforms to provide added value in their teaching practice. It was stressed that digital technology is providing many opportunities but a 'blended learning' approach is likely to be needed in the majority of situations. Furthermore, the ratio between online and on-campus activities is dynamic depending on subject-specific and pedagogical factors such as the learning outcomes that the lecturer is aiming to achieve or the composition of the student group. It was emphasized that for education in life sciences on-campus and in particular on field/in lab training is essential for graduates to be well prepared for the job market.

2. Reflections of students and staff on online teaching during the Covid pandemic

Over the past two years, many students had to switch from one extreme, i.e. traditional on-campus classes with only a few online alternatives, to the other extreme in the full lockdown, taking (almost) fully online classes from their desk at home. Students recognize the advantages and disadvantages of both forms of teaching. Students appreciate the flexibility of online teaching (and having a recording of these lectures available), in particular, related to no time wasted for commuting and access to lecture recording in the case of sickness, accident or other engagements. However, the majority of students are in favour of a substantial part of education occurring on-campus (and thus some form of blended approach).

On-campus education is important for students to develop their social competencies. Face-to-face meetings and student extra-curricular activities are important to build a network of study friends, to support an individual's well-being and to encourage a sense of belonging during the learning process. During the Covid lockdown period, many students suffered from loneliness and reported a loss of social intelligence and decline in physical and mental health. But also the direct interaction with the lecturer and teaching assistants was identified as added value for engagement in the study program as noted from the following student citations: 'only now I am becoming excited about my studies', 'no more remote studies, my learning sucked'. It was noted during the Covid period that the attendance rate of online classes was often not satisfactory as participation needed a high level of discipline and responsiveness. Students also suffered from procrastination which also impacts study results. Therefore, students prefer on-campus learning activities as it provides them with structure and encourages them to attend lectures and exercises within a fixed time slot, enabling good planning and study discipline.

Still, students noted that they appreciate lecture recordings being available. There is some debate on the latter as the availability of lecture recordings carries a real risk of reducing on-campus attendance, which has sometimes been linked to weaker study results. At some institutes, the policy is not to have [- in particular in the first years of the undergraduate (Bachelor) program]- lecture recordings at all in the post-Covid era. Other universities only provide student access to recordings with after a delay or during a restricted time period as an addition to on-campus attendance to be used as additional study materials (e.g. re-viewing more difficult elements) in preparation for exams. In particular, it was emphasized by the Colloquium participants that “recycled” lecture recordings from the former years can never replace an entire set of educational activities in the current year. Additionally, students do not like to see “out of date” materials. In a blended education trajectory, the content of pre-recorded lectures should be checked to ensure they are still topical and should only be used as an element of self-study, in combination with exercises or interactive response lectures.

For many lecturers in higher education institutes, the Covid lockdown and restriction periods were not a pleasant experience. They struggled with their intrinsic motivation to teach; in particular, many academics missed the direct interaction and involvement with students. As such the delivery of content of courses went, taking all circumstances into the account, quite well. But it was not an enjoyable experience and often the switching to 'emergency eLearning' was stressful, time-consuming and less-rewarding. One of the main challenges were the deficiencies in teachers' digital skills. Therefore, during the post-Covid period technology training focused mostly on the technicalities of digital tools and platforms rather than emphasizing the implementation of technology in learning practices. This resulted thus in variable experiences with online teaching and differing opinions among lecturers post-covid about moving further with the use and embedding of digital tools and platforms in higher education in the post-Covid era.

To sustain a blended approach in teaching it is important to integrate both aspects (pedagogy and technology) into teachers' training. For example, it is important for lecturers to know the pedagogical opportunities and constraints of a range of technological tools. Having said that, lecturers in their respective discipline have the knowledge of what makes scientific concepts difficult or easy to learn, and how technology can help redress some of the problems that students face. This relates to interactions among content, pedagogy, and technology. The Technological Pedagogical And Content-Knowledge (TPACK) is a theoretical framework that was discussed at the Colloquium to move beyond oversimplified approaches that treat technology as an “add-on”. It emphasizes the need for a forward-looking, creative, and open-minded seeking technology use, not for its own sake but for the sake of advancing student learning and understanding. This evidently needs a vision and possible strategic initiatives from the university, faculty or school senior management to support staff development in this evolution towards an optimal mix of online and on-campus teaching (at an individual course level) or education (at the study program level). Some examples of how to support staff development to benefit students using blended learning were given in the presentations by the invited speakers.

3. Opportunities and challenges for university/faculty to adoption of the blended learning approach

University/faculty educational policy and study program developers have the responsibility to orchestrate students' learning process by offering them appropriate content, structure and aligning all learning activities. Digital technology should not be used just because it is available, or to attract more students, or to solve problems of classroom capacity or tolerate 'less competent teachers'. The main driver for a blended learning approach and the use of digital tools and platforms by universities or faculties should be because it can support improved competency-based education and help prepare students both for the workplace and society. It was emphasized by the Colloquium participants that another important incentive for institutes/faculties to promote a blended approach is inclusivity and diversity and the fact that it provides opportunities to make learning adjustable to personal needs and preferences. Specific target (sub)groups can in particular gain from a blended approach and online teaching activities (synchronous or asynchronous). This is especially the case for students who are temporarily unable to come to campus (temporary difficult circumstances in personal life, students staying abroad), students combining working and studying at university, or students to whom the educational language of an institution is not their mother tongue.

There are multiple challenges that universities and faculties will have to deal with when they want to adopt a blended teaching approach. It was mentioned at the Colloquium that these challenges situate themselves at the level of the institute and its educational policy, the lecturers/instructors, the students, and of course technology and infrastructure.

The educational policy of the institute will shape the mindset and set the vision it has on teaching in the post-Covid era and thus provides guidance on how a blended learning approach can (or should?) be introduced in curricula.

Investing in staff development is essential as many lecturers require new pedagogic or digital skills to start redesigning courses in an educationally-robust blended manner . It was mentioned at the Colloquium that learning networks that cultivate connections across teachers (and their assistants) in the institute within the disciplinary community with an emphasis on collegial sharing of experiences, exchanging good practices, and providing the ability to ask questions in a safe environment are appreciated by the instructors. These learning networks are complementary to training by educational developers and are less overwhelming for lecturers to actually get started with the implementation of blended learning in their courses or study programs. The student voice can also add a strong positive dimension in the blended re-design and thought needs to be given on how this can be effectively incorporated in a constructive manner.

Although students are in favour of coming 'back to campus', but for them this does not necessarily mean 'back in in the classroom, back in the lecture'. A blended approach (combination of on-campus and online teaching activities), if achieved in a well-considered mix, can contribute to an effective learning process for students. It should however be noted that in a blended learning environment, students are pushed more towards independence and self-management, and thus additional attention and care should be given to support

students' learning process, to promote interaction and to create an engaging and considerate learning environment and motivate student's learning. After discussion at the Colloquium, a blended approach in undergraduate (Bachelor) study programs with a 20 -30% of online component versus on-campus activities was considered acceptable for these starting students. On the other hand, in graduate (Master) programs in life sciences, a 50/50 ratio, with the on-campus activities mainly focused on higher levels of Bloom Taxonomy (analyze, evaluate, create), was thought to be feasible since students are more mature and already have built better metacognitive skills,

It was noted at the Colloquium that a blended approach provides excellent opportunities for developing lifelong learning courses (e.g. microcredentials). Several ICA-Edu universities/faculties have invested in MOOCs. Although lifelong participants are considered to be intrinsically motivated to self-direct their own education, the provision of some on-campus teaching activities or opportunities to physical meet will promote critical thinking, collaboration skills and adoption of what is known as an 'academic mindset' for deep learning, a skill highly appreciated in employees by companies.

To accomplish high-quality teaching in a blended learning approach, evidently, the investment will have to be made in high-performance digital tools, learning analytics systems but also appropriate infrastructure. Various online teaching platforms with a multitude of formats and tools to promote interaction during or after lectures, facilitate break-out rooms or discussion groups, use polls, etc. are available. However, there are still improvements to be made in 'online assessment' tools (as an intrinsic part of teaching is also evaluation). There are already tools to check plagiarism but experience and trust in proctoring tools for examination is still an issue at several institutes. In addition to software it is likely that substantial investments will have to be made in classrooms (e.g. recording video cameras tracking teacher's movement, interactive flat screens display devices for facilitating student online collaboration) as well in the campus layout or organization (e.g. need for 24/7 accessible libraries or other dispersed and accessible locations with a good internet connection, sufficient bandwidth) for transition to a campus of the future. Flexibility will come at a cost.

Conclusion

Blended learning is not a simple straightforward conversion to be made in a study program. It will most likely be taken up in curricula stepwise in a well-considered and feasible manner, often driven by a clear institutional and faculty strategy and vision. The university/faculty will have to invest in infrastructure, provide guidance for Programme Committees and support staff development if blended learning is to be integrated in an educationally-robust and sustainable manner. Both lecturers and students should feel comfortable with the blended teaching practice, and high-quality education is at all times the ultimate goal. There is no "one best way" to integrate technology into the curriculum. Rather, integration efforts should be creatively designed or structured for a particular subject matter idea in specific classroom contexts. Those lecturers who had positive experiences during the Covid pandemic of utilizing blended learning successfully can act as early adopters and inspire and motivate colleagues. Students value the flexibility in time and space for their study but will need to be trained as well in time management, discipline and responsiveness.

Here are some questions, based on the outcomes of the discussion at the Colloquium reported here, which you may wish to consider when reflecting on your use of blended learning in your students learning:

1. Is my use of blended learning compatible with the institutional policy on blended learning?
2. Do I make full use of the available institutional educational support for training about how digital tools can facilitate student learning and enhance my teaching ?
3. Do I share my knowledge and experience of the range of technologies that are available to facilitate blended learning with my colleagues and benefit from learning from their experience?
4. When reviewing and developing my courses do I mainly focus on the learning content and updates in the research domain? Do I invest (enough) time as a university lecturer to enhance my pedagogical skills, particularly in relationship to blended learning, and their potential benefit for my students learning?
5. When a significant programme review is undertaken in the context of the curriculum and in the forms of tuition, including the use of blended learning, do I sufficiently consult with my students of their experience and expectations, and ensure that the department consults with potential employers?

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