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Published in:
Distance Education

DOI:
10.1080/01587919.2023.2280064

Publication date:
2023

Document version
Publisher's PDF, also known as Version of record

Citation for published version (APA):
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To cite this article: Simon Goorney, Matoula Sarantinou & Jacob Sherson (2023) The open master: A new model of transnational higher education, Distance Education, 44:4, 765-776, DOI: 10.1080/01587919.2023.2280064

To link to this article: https://doi.org/10.1080/01587919.2023.2280064

Published online: 07 Dec 2023.
The open master: A new model of transnational higher education

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\textbf{ABSTRACT}
In this article, we conceptualize a new model of transnational education: the \textit{open master}. Arising from higher education for emerging fields such as quantum technology and artificial intelligence, the open master addresses the urgent need for advanced digital skills. We consider how, using distance education, specialist courses can cross borders to reach students for whom they would otherwise not be available. Within the pantheon of transnational education modalities, the open master, based on the principles of open, distance, and flexible learning, is not limited by pairwise institutional partnerships, instead relying on local accreditation, the means by which students receive credit for their studies conducted through the open master. Within European universities, these primarily utilise special courses (A) and opening new courses (B and C). Here we reflect on the role of the open master on the path toward the future: creating a truly open ecosystem for specialist higher education.

\textbf{ARTICLE HISTORY}
Received 3 April 2023
Accepted 16 October 2023

\textbf{KEYWORDS}
transnational education; accreditation; internationalization; credit transfer; quantum technology; future and emerging technologies

\textbf{Introduction}
In formulating the goals of the Digital Decade, the European Union (EU) has set a target of developing 20 million information and communication technology specialists in advanced digital fields such as artificial intelligence, quantum technology, and cloud computing. It believes that higher education should be the provider of such skills, which have grown in demand steadily since 2012 (Eurostat, \textit{n.d.}). However, the current state of high-technology industries is such that they are severely limited in growth by lack of a trained workforce. This is already clear in the job market, where the majority of advanced digital fields suffer a talent deficit: often more than 10 job positions for each qualified applicant (Chui et al., 2023). EU policy for closing the gap in availability of specialists is primarily through the development of specialist master’s programs (European Commission, 2021; Quantum Flagship, 2018).

However, the number of such programs is currently insufficient to supply the skills needed for the growing European high-technology industry (Kaur & Venegas-Gomez, 2022). The EU acknowledges that there is a “lack of capacity in terms of specialised...
education and training programs in areas such as Artificial Intelligence, quantum and cybersecurity” (European Commission, 2021, p. 5). The most straightforward resolution to this problem, creation of many new programs, would require “massive investment” (European Commission, 2021, p. 5). Besides the substantial cost, it is also beyond the ability of many institutions to create new specialist master’s programs. One major issue is the competitive nature of funding, which biases successful applications toward selected institutions with a record of success in EU grant applications (Banal-Estañol et al., 2019; Pruvot et. al, 2015). Lengthy national accreditation procedures are also a problem, as these take place independently from European approval (Romanowski, 2022). Perhaps the greatest issue is the need for a critical mass of teaching faculty with expertise spanning a variety of advanced subfields, such that they are able to staff and teach a full 1- or 2-year master’s degree.

With an insufficient number of master degrees available, and limited means to create new ones, advanced digital fields are suffering from a lack of accessibility to specialist education, an issue which is already manifest in the job market (Chui et al., 2023). In this article, we conceptualize, discuss, and reflect on a solution to this problem, introducing a new model of higher education in which specialist expertise can be shared across borders, reaching students for whom it would otherwise be unavailable.

**The tools of the Bologna Process**

One solution may be designing new and more flexible modes of education which can support wider access to specialist skills. Developing flexible learning models has been one of the core tenants of the EU’s Bologna Process, a series of reforms to higher education spanning the last 24 years (Bologna Follow Up Group, 2020; Pocius et al., 2017). The monitoring groups which follow the process have recently highlighted a growing emphasis on student ownership and independence (Bologna Follow Up Group, 2020; Klemenčič, 2017), whereby they should be able to plan and optimise their learning such that they can acquire the knowledge, skills, and competences for their personal goals and societal needs. (Bologna Follow Up Group, 2020). A variety of instruments, such as the European credit transfer system (ECTS), the diploma supplement, and standardized degree classifications (the European qualifications framework; Council of Europe, 1997; European Commission, 2015, 2017), have been developed in order to support these reforms. The evaluators of the Bologna Process have highlighted the importance of developing “measurable, qualitative indicators” for new models of education, such as those offering small, flexible course units (micro-credentials), and transnational models (Albanian BFUG Secretariat, 2021–2024, p. 1). Within this article, we reflect on the first steps toward a qualitative assessment of one such new model, we call the open master.

**Education crossing borders: transnational education**

Given the substantial investment and difficulties associated with scaling up the number of master’s programs in Europe, an alternative approach may be needed. Here, we consider a means to spread expertise from a limited number of centers across Europe,
making it accessible to a larger number of students. To do so, a model is needed which enables education to cross borders: *transnational education* (TNE).

TNE is also referred to as “cross-border,” “offshore,” and “borderless” (Knight, 2016). While encompassing a number of different formulations, its defining feature is that the geographical location where the education takes place (the local university) and that where the qualification is awarded from (the overseas of foreign university), are in different countries. In this way, it may be most concisely summarized as education which crosses national borders (Wilkins & Juusola, 2018b). TNE has developed into a major sector of international higher education, particularly in the United Kingdom, United States of America, and Australia (Yencken et al., 2021). In the United Kingdom alone, over 550,000 graduates were awarded British degrees while studying in overseas countries in the academic year 2021–2022 (Universities UK, 2023). TNE has also attracted much scholarly attention, particularly with respect to its political and economic implications (Angouri, 2023; Wilkins & Juusola, 2018a) as well as the diverse and sometimes transformative student experiences generated (Che, 2023; Ergenc, 2020; Yu, 2020) from this unique mode of study. Francois et al. (2016) and Knight (2016) have outlined several core modalities of TNE, and these are shown in Figure 1. Common to all of these formulations of TNE is that the education crosses national borders, while students do not.

![Figure 1. Four primary formats of TNE (based on Francois et al., 2016). (a) Branch campuses, wherein a university in one country sets up a branch in another. Teaching is conducted in the branch campus, and the qualification is awarded from the university abroad. (b) Franchise arrangements, in which a university in one country licences a local university in another to provide components of, or the entirety of, the qualification. (c) Articulation-based arrangements in which an agreement is made between a local and overseas university that credit in the overseas program may be awarded for local education. Many of these arrangements also lead to joint or multiple degrees. (d) Fly-in/fly-out arrangements, in which staff in the abroad partner are sent to the local university to teach and provide the education for a temporary period.](image-url)


**Distance learning: TNE reimagined**

Distance education, where “learners are separated from their teachers and the teaching institution” (Zawacki-Richter & Jung, 2023, p. 6), is a natural fit for being able to deliver education across borders. The advent of the COVID-19 pandemic has fundamentally changed the TNE sector, such that distance education is now “part of the family” (Stewart, 2019, p. 26). Previous attempts to use distance education in specialist fields have made use of joint programs with a distance education component. The EU has historically supported this approach, first in the Erasmus Mundus Joint Masters Program (European Commission, n.d.a) and more recently the European Universities Initiative (European Commission, n.d.b). Joint programs can certainly help to make specialist skills more accessible, but as described, they still come at a great cost, requiring significant institutional support and national approval (Pruvot et al, 2015; Romanowski, 2022).

Advanced digital fields require a more accessible education arrangement than that which is possible with limited numbers of single or joint master’s programs. Instead, a model is needed in which specialist courses may be accessible for students in any university, such that they are not limited by geography or the specific expertise of their university of study. This is the philosophy of open, distance, and flexible learning (ODFL), in which learners are given additional choices by removing barriers to study (Bozkurt, 2019). TNE arrangements currently in existence, even those using distance modalities, are far from open. They are unique to the pairwise partnerships of the universities involved, not accessible to all students regardless of their university of study. In order to best address the lack of accessibility facing advanced digital skills, we formulated the open master as a model based on the principles of ODFL. While there has been a great deal of recent scholarly attention on curricula, pedagogy, and administrative support for ODFL (Reiffenrath & Thielsch, 2022; Zawacki-Richter & Jung, 2023), there is yet to be a model for TNE designed using ODFL. Here we consider such a model and the mechanisms involved in its function.

**The open master model**

The open master (Figure 2) is a transnational model of master’s education, in which specialist courses in advanced digital fields are shared across borders. In the open master, students enrolled in any master degree at a local university follow one or more specialist lecture courses provided in distance format by overseas universities. The courses are not extracurricular. Rather, they are embedded into the degree program as elective (optional) components. Credit for study is awarded directly by the local, degree-awarding institution rather than the universities providing the teaching, making the system significantly more accessible, as the providing institutions do not have to enter into any kind of memorandum of understanding. By crossing national borders, the program becomes transnational. However, the open master does not rely on establishing institutional partnerships. Rather, it depends on the local institutions recognizing the study conducted and awarding credits in their own, local, program accordingly.
Accreditation: a crucial lynchpin

Accreditation, that is, acknowledgment of learning, is perhaps “the hallmark of higher education” (Conrad, 2022, p. 1). In TNE, institutional partnerships make this process possible. How can this be managed when such articulation arrangements do not normally exist? Conrad (2022) has highlighted credit transfer (CT) and credit equivalency (EQ) as the methods in practice. Could CT or EQ be a solution for the open master? CT is not a local process—it would require first the awarding of credit by the providing institution, and therefore this is not operational for the open master. EQ requires matching the competences attained through learning or life experience which may otherwise be available locally (Conrad, 2022). In the open master, specialist education is not available in the awarding institution—the very purpose of the model is to provide it from abroad. A new method of accreditation therefore needs to be operationalized in order for this model to work.

We define local accreditation as the means by which institutions recognize transnational study and award credit locally using a course in the study program. It is local in the sense that the entirety of the mechanism is based at the awarding institution. There is no credit articulation agreement (Francois et al., 2016; Knight, 2016) or memorandum of understanding (Porter & Perris, 2022) which would facilitate credit transfer. Implementing TNE without such agreements opens up the possibility of a truly open landscape in which specialist courses can be easily shared across borders, not limited by pairwise arrangements. However, despite making use of the well-established ECTS intended to facilitate flexibility (Council of Europe, 1997), local accreditation is not supported with policy on either a national or European level. It is thus essential that these mechanisms, in their application, are better understood in order to examine how they may be used to implement open models of TNE, such as the open master. In the next section, we discuss how local accreditation is currently implemented in European universities.

Figure 2. The open master model of TNE. Students at a local university study one or more online-taught courses from centers of specialist expertise in universities across Europe. Rather than requiring an established partnership to recognize credit, the local universities award ECTS using a local accreditation mechanism.
The open master in practice

Several recent innovations in higher education, such as micro-credentials (DeakinCo., 2017; International Council for Open and Distance Education, 2019) and the European Universities Initiative (European Commission, n.d.b), have begun life as exploratory pilot projects, testing “what would be a vision for the future” (Charret & Chankseliani, 2022, p. 38). As a proof of concept, therefore, a pilot open master has been set up in the field of quantum technology and used to investigate how this model may be further developed and implemented in the future. Using a participatory action research paradigm (Kindon et al., 2007), in which staff operating the Quantum Technology Open Master pilot (QTOM, Quantum Technology Open Master, 2023) implemented a quantum technology open master across 26 European universities, we reflect on its viability as a means of closing the digital skills gap facing the EU.

Characteristic of participatory action research is a collaborative effort between the researcher and the participants of the research (Fletcher et al., 2015; Shearn et al., 2022), in this case the local representatives of the pilot who implemented the pilot open master in their organizations. Over the duration of the academic year 2021–2022, the QTOM pilot used an online platform to exchange specialist quantum technology courses across European universities. From this platform, students of non-specialist science, technology, engineering, and mathematics (STEM) master’s programs could select one or more specialist quantum technology courses to study in distance education format. This would in effect act as a quantum augmentation of their STEM degree, and thus help to position them toward an industry career.

Drawing on the experiences of the researchers, students, and participants in the QTOM pilot, as well as 20 semi-structured interviews with participating university staff, here we operationalize local accreditation as it is realized in European universities at the present time. Interviewee descriptions of available mechanisms enabled a division into two main operational categories of courses used by staff to provide ECTS credits to students studying courses from the open master. These are shown in Figure 3 and summarized below.

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**Figure 3.** The primary division in practical types of courses used to provide local ECTS for studies in the open master: special course types (A) and opening new courses (B, C).
**Special course types (A)**

Special course type mechanisms (A) are existing courses within the local degree programs which are specifically designed to be mapped to one-off, elective opportunities and offer some flexibility for students within their overall degree. Interviewees described them using terms such as *joker card* and *free course*, ascribing these course types, in which a member of staff acts as a “guarantor”, as an informal and pragmatic means to accredit online courses.

A type courses can be used in an open master, by offering students study of online-taught courses and then assigning them credit using the A type mechanism. However, there is no standardization among these course types, and they can work rather differently between institutions. In some cases, courses accredited using A types may not appear by name on degree transcripts, instead showing a code or generic title such as “traineeship” or “special topic.” Many are limited to a specific number of ECTS, and some involve additional local examination requirements which can be a burden for both staff and students. Furthermore, some interviewees described how repeated use of their “jokers” may generate scrutiny from the department, and that they are designed to be used by individual students. Thus, they may not be practical for implementing an open master on a program-wide scale.

**Opening new courses (B and C)**

The other primary avenue for local accreditation of online courses involves staff opening new local clone courses of those available online (such as massive open online courses) through the open master. The courses appear in the learning management system of the awarding institution, either for individual (B) or all (C) students on the degree program. In this manner, distance education may be embedded directly into the program of local students. The exemplary cases of B and C courses are those where the administrative requirements associated with opening the course were minimized by use of straightforward systems, such as integration directly into the local learning management system. In addition, B and C type courses can become permanent features of the degree program, making it possible to integrate courses from the open master for years to come.

**Discussion and reflections**

The experience of participants in the QTOM pilot suggests that A, B, and C type courses can provide viable mechanisms for local accreditation. However, they each have their own advantages and disadvantages. In all cases, a key challenge remains that these systems can be administratively complex, time-consuming, and not well communicated to either staff or students. The most effective mechanisms are those which are uncoupled from bureaucracy and have features which allow them to be scaled up for many students, most frequently C type courses.

Perhaps the lack of standardization in this regard can be addressed by EU steering (Wilkoszewski & Sundby, 2014), with practical recommendations for how local accreditation may be used to implement open models of TNE. In addition, and equally
important, is a need for national recommendations to promote active participation in, and evaluation of, pan-European experiments and future pilots in international education, for their role in developing “sustainable innovations” (Prenger et al., 2022, p.12) into the future.

A truly open ecosystem?

In the long term, the open master could be a first step toward a truly open model of education, one which may address the problem of accessibility to specialist skills currently faced by advanced digital fields. If it were supported from the top-down, local accreditation mechanisms may be standardized and available in all European universities, analogous to the now ubiquitous instruments such as ECTS and diploma supplement. Any student in a nonspecialist degree program may then choose to augment their studies with a transnational course from the open master, enriching their experience with specialist expertise and going a substantial way to overcome the need for additional training to take an industry career.

There is no doubt that we are still far from such a model, but note that the open master is a proof of concept which can help accelerate the changes required to make it possible, much like other innovations before it (DeakinCo., 2017; International Council for Open and Distance Education, 2019). The route toward this truly open landscape requires further efforts such as this, which may come with some investment for those pathfinding organizations. However, even small investments come with a substantial “transformative value” (McDonald & Mercieca, 2021, p. 11) associated with participation. In the case of QTOM, several teaching faculty noted that the backstage conversations (Roxå & Mårtensson, 2009) they undertook in setting up the local accreditation mechanisms acted as a catalyst to kickstart a self-sustaining community within departments. This “transformative value” will remain beyond the conclusion of the open master pilot, and we hope it may continue to fuel innovations into the future.

Conclusion

The conceptualization and evaluation of the open master offers a new model of TNE that can allow for training master’s students in specialist areas which would not otherwise be available to them. It shows potential as a means of growing the specialist teaching capacity of many institutions, thus helping to develop a much-needed workforce for emerging technologies such as, but not limited to, quantum technology.

The open master relies on the mechanism of local accreditation, which we define as the means by which institutions recognize online study and award credit in a local study program. Local accreditation is currently not supported with policy on either a national or European level. Nevertheless, we believe that, as a proof of concept, the model holds great value in widening access to specialist skills. Should local accreditation be further developed with recommendations for implementation and experimentation from top-down, we may envisage a sustainable model in open education, where every student can access the specialist skills they need for industry. We could
envisage an extended, open, ecosystem of universities across Europe and elsewhere, offering their students access to specialist courses from other institutions. Doing so may go some way toward overcoming the barriers faced in developing sufficient capacity to teach in specialist areas of emerging technologies.

A central message of our effort with the open master is that the very process of engaging with such an international experiment generates value independent of its degree of success. TNE, as a continually growing and valuable way of learning and teaching, deserves further attention to be able to explore new dimensions of openness, including new ODFL models, and student experiences in the future of higher education.

**Disclosure statement**

No potential conflict of interest was declared by the author(s).

**Funding information**

This work was supported by the Horizon 2020 project Coordination and Support Action for Quantum Technology Education under Grant Agreement ID 951787.

**Notes on contributors**

*Simon Goorney* began this research operating the QTOM pilot, the first testbed of the open master in practice. The principles of the open master are now used in Europe’s largest quantum technology education project, DigiQ. Simon is managing DigiQ while researching future models of education for advanced digital fields.

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