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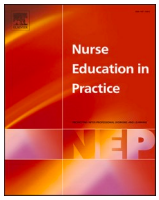

An international exploration of blended learning use in pre-registration nursing and midwifery education

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ABSTRACT

Aim: To explore international experiences of using blended learning in preparing nursing and midwifery students for initial professional registration to inform future education policy.

Background: The global nursing and midwifery skills shortage and need for an expanded nursing workforce that is fit for contemporary care delivery is widely acknowledged. The immense pressure the profession was already under because of austerity, staff shortages and increasingly complex healthcare needs has been worsened by the Covid-19 pandemic. The UK is extending and evaluating the use of blended learning programmes for pre-registration nursing and midwifery students to help address these issues. This study sought to explore relevant nursing and midwifery experiences from outside the UK to help inform future health professional education policy here and elsewhere.

Design: Cross-sectional, sequential, mixed methods study

Participants/settings: Nursing/nurse education leaders from across International Council of Nurses regions

Methods: Exploratory online survey (n = 32) and three follow-up case studies (March-May 2021). Participants' knowledge and experiences of blended learning were examined along with any perceived benefits for workforce development and successful strategies for addressing the challenges blended learning presents in this context. Case studies were developed inductively from survey responses and follow up telephone calls to provide more detailed information about reported successes.

Results: Participants reported flexibility, cost effectiveness, increased student/tutor and student/student communication and interaction as benefits of blended learning. Challenges included the design and use of interactive learning resources, appropriate preparation and support for staff and students, the potential of blended learning to exacerbate otherwise hidden disadvantage and the need for multi-stakeholder cost/benefit evaluation.

Conclusions: Blended learning is used globally in the pre-registration education of nurses, midwives and other healthcare professionals. These results broadly mirror the literature regarding the benefits blended learning offers healthcare students, staff and organisations and the strategies employed to mitigate risk. As the deployment of blended learning nursing and midwifery programmes expands, further work is needed to address gaps in the current evidence base regarding the practice and impact of this approach. These concern adequate preparation and support of students and staff, ensuring access to appropriate equipment and connectivity, exploration of student perceptions that online learning is of lesser value and comprehensive multi-stakeholder, exploratory evaluation to uncover any hidden factors and impact.

Tweetable abstract: Blended learning plays an effective part in the education of pre-registration nursing and midwifery students to help tackle global workforce shortages, but further work is needed to address gaps in the current evidence base regarding the practice and impact of this approach.

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1. Introduction

The important role of nurses and midwives in healthcare today is recognised; the shortage of nurses in particular and need to expand the nursing workforce globally (Drennan and Ross, 2019; ICN, 2022) and in the UK (NHS England, 2020) acknowledged. The immense pressure on the profession from austerity, staff shortages and increasing complex healthcare needs (Sizmur, 2018) has been exacerbated by Covid-19 (WHO, 2021; ICN, 2022). Changing population health needs and models of care mean digital and remote working capability are increasingly important for healthcare professionals (Topol, 2019); using a blended learning approach that fully exploits the available technologies to facilitate theoretical and practical learning can contribute to developing digitally capable nurses and midwives, ready to deliver safe 21st Century care. Increased technology in everyday life has brought about changes in knowledge distribution, construction and reconstruction (Ibrahim and Nat, 2019). The accessibility of information and communication technologies has also transformed higher education institutions into multi-choice learning environments that can enhance learning independent of time and place when based on individual preference and methods to complement classroom-based learning. Blended and e-learning have therefore gained popularity in healthcare education (Jowsey et al., 2020). Blended (combined online and classroom based) learning (Moradimokhles and Hwang, 2020) that gives students more flexibility to customise their learning experiences (HEE, 2022), is particularly attractive to institutions and policy-makers due to its positive impact on student motivation and performance, accessibility and convenience (Leidl et al., 2020; Bramer, 2020; Lu et al., 2018). However blended learning has become an umbrella term used to describe any type of education that includes face-to-face and synchronous and/or asynchronous online learning (Hrastinski, 2019), creating inconsistency in the literature.

Blended learning is rapidly becoming the new standard for nursing education (Leidl et al., 2020) based on reports that for example, nursing students prefer it to exclusively traditional face-to-face methods in bioscience (Bramer, 2020; Montayre et al., 2019). Though many nursing students view online learning positively, there is consensus that it should complement rather than replace traditional methods, amid increasing evidence regarding the challenges associated with its successful deployment. For example, Bingen et al. (2020) highlighted the importance of interactive on-campus activities for nursing students alongside online methods. The student-centred, interactive nature of well-designed online learning reflects the 'flipped classroom' approach also used in modern on-campus pedagogy. The 'flipped classroom' involves students engaging with pre-class materials followed by in-class activities designed to help them synthesise, apply and evaluate information to develop deeper understanding (Kim et al., 2019).

Systematic reviews have found blended learning can increase student satisfaction (Betihavas et al., 2016) and improve knowledge and satisfaction in nursing students (Li et al., 2019), but also highlight a relative lack of research on the topic. In addition, online simulation can encourage shared learning and help students learn outside their comfort zone, with positive benefits including increased confidence, learning from peers and other fields (Warren, 2021). Students also value the verbal, visual and auditory stimulation online learning can offer and the learning benefits arising from this (Moradimokhles and Hwang, 2020). These findings support previous studies of undergraduate nursing students' use of video technology in developing clinical skills confidence (Stone et al., 2020; Willemse et al., 2019; Burns et al., 2019). Similarly, patient safety attitudes, knowledge and skills significantly increased when using a blended, 'flipped classroom' approach to competency development (Kim et al., 2019). However, a quasi-experimental study (Missildine et al., 2013) found nursing students were less satisfied with a 'flipped' versus traditional classroom format despite achieving better grades. Whilst Simpson and Richards (2015) found no differences in course evaluation between these two approaches, when asked for specific feedback regarding the flipped classroom, it was rated better on flexibility and technology, characteristics valued by undergraduate nursing students.

Systematic reviews indicate blended learning can potentially improve healthcare students' practical knowledge and clinical competency, helping bridge the gap between theory and practice (Kang and Kim, 2021) and is no less effective than traditional methods in developing undergraduate nurses' clinical skills (McCutcheon et al., 2015). Similarly, web-based courses enable post-registration nurses to change their way of thinking and supporting families (Pusa et al., 2019). A meta-analysis (Li et al., 2019) found blended learning had a positive effect on knowledge attainment compared to traditional learning approaches. Though the evidence underpinning this finding was limited, it is consistent with a systematic review (Männistö et al., 2020) finding that digital collaborative learning increased students' knowledge and nursing skills. The mechanism for this may be in supporting the formation of independent learning habits and preventing the student dependence on teachers which traditional teaching methods can foster. Hart et al. (2019) highlighted similar benefits from using online visual technologies in the healthcare setting, which provide easier and better avenues for student and placement collaboration, improve the efficacy and quality of support and successfully bridge geographical divides saving time and travel costs, though face-to-face methods were better for providing intensive student support.

To foster collaborative learning, environments must be student-centred, taking into consideration issues affecting the collaborative process. These include factors like the learning environment (Harrati et al., 2016), teaching design (Leidl et al., 2020) and socioemotional aspects of interaction that may help or hinder productive collaboration (Männistö et al., 2020). For example, combining blended learning with problem-based learning ensures effective learning among nursing students (Oh and Yang, 2019). Scholars (Regmi and Jones, 2020; Oh and Yang, 2019; Häggman-Laitila et al., 2016) advocate multifaceted approaches beyond face-to-face teaching to promote effective learning, but also emphasise training teachers in these techniques. An organised move towards complementary approaches is necessary because students also face challenges with online learning. Examples include inadequate communication and support for interaction, significant preparation time outside class, difficulty staying organised without on-campus contact and lack of offline instruction from lecturers (Bramer, 2020; Jia et al., 2019).

Prerequisites for taking an online course are personal preconditions such as motivation and social interactions, including a well-functioning social climate and support (Pusa et al. (2019). "Social presence" or ability to perceive others in an online environment, positively impacts student motivation and participation (Abuatiq, 2019) and is therefore an important consideration in blended learning design. Whilst ability to interact, support each other and access support from those responsible for the web-based learning were perceived as key, the independent, personalised learning (Shang and Liu, 2018), enhanced communication skills and computer self-efficacy that blended learning offers also motivated nursing student acceptance (Shorey et al., 2018).

Purposive blended learning is effective, especially in supporting distance education (Jowsey et al., 2020) and its flexibility attractive to 'non-traditional' students who might not otherwise consider nursing or midwifery. This offers potential for widening access to the profession, for example for mature or remote learners and an adaptive, collaborative learning experience (Leidl et al., 2020). An anticipated impact of blended learning is its potential to promote inter-disciplinary and inter-professional learning through online communities of practice. Experiences of using blended learning programmes to support student learning globally may offer transferable learning to inform pre-registration education policy in the UK and other countries who have not yet maximised its use. This study therefore aimed to explore international experiences of blended learning in pre-registration nurse/midwife education to identify any added value, associated

challenges and strategies for successfully addressing these, to inform future health professional education policy development.

2. Methods

The reporting of this study adheres to the STROBE guidelines (Vandenbroucke et al., 2007).

2.1. Design & setting

We applied a cross-sectional, sequential mixed methods exploratory study design involving an online survey of nursing/nurse education leaders from the International Council of Nurses (ICN) regions and follow up case-study development.

2.2. Participants and recruitment

Purposive snowball sampling was used. Members of pre-existing nurse/nursing education leader and midwife/midwifery education leader networks (comprising Global Nursing Leadership Institute (GNLI) alumni) with experience of blended learning were invited by email to participate and/or circulate the study information across their in-country networks to raise awareness and maximise recruitment. This recruitment strategy meant the number of surveys distributed was unknown therefore the response rate could not be calculated. GNLI alumni are competitively selected by the ICN as nursing and midwifery practice, education and/or research leaders. The study pack included all the information to enable informed decision-making about participation (i.e. study objectives, confidentiality and General Data Protection Regulation (GDPR)) and a link to the anonymous survey. All participants could participate in follow up case-study development by providing a contact email.

2.3. Data collection

2.3.1. Online survey

The draft survey was developed by the research team with reference to the study aim and academic literature. It was piloted with three nursing/midwifery educators with relevant experience who were identified using the team's international professional networks. Adjustments to question wording and format were made to enhance usability based on pilot feedback, then survey data was collected using a secure online platform (Qualtrics) provided by the university, supporting appropriate adherence to data protection regulations and legislation. To address the study aim, survey questions covered key participant demographics, the nature of blended learning used (e.g. fully blended, partially blended i.e. part rather than a whole programme) and open-ended questions about any benefits/challenges and how challenges were addressed (see supplementary file 1). Tailored survey design minimised respondent load to encourage completion. The number of responses was tracked and general awareness raising undertaken via in-country ICN network contacts to maximise responses. The survey remained open for eight weeks. Responses were analysed on an ongoing basis and saturation, based on the concept of 'information redundancy', was judged to have been achieved by this point as responses ceased to yield novel insights or themes (Braun and Clarke, 2019).

2.3.2. Case studies

All participants reporting examples of successful blended learning in the survey and who provided follow up contact details were contacted to arrange a 1:1 audio recorded telephone call with GJ of 30–60 min. During this call, participants were invited to provide further detail regarding the specific blended learning example they submitted to the online survey, using an initial open-ended question and follow-up probes to explore their context and experience of using BL, along with any challenges and how these had been addressed based on their responses. This information was summarised (GJ/ME) in a brief case study. The case studies provided qualitative information to supplement the survey data. Survey data was collected March-April 2021 and case studies developed April-May 2021.

2.4. Data analysis

Descriptive statistical analysis of the demographic elements of the survey data. Inductive thematic analysis of all free-text survey responses (ME & GJ) using the six stages of Braun and Clarke (2006) namely: 1. familiarisation with the data, 2. generating initial codes, 3. searching for themes, 4. reviewing themes, 5. Reviewing themes- and defining final themes and 6. producing a report, enabled theme development, comparison by nation, setting, discipline, and identification of convergence, divergence and gaps in experiences. Each case study was member-checked for accuracy with the survey respondent.

2.5. Ethical considerations

Manchester Metropolitan University Ethics Committee granted Ethical approval (EthOS ID 29057).

3. Results

Section one presents the survey results; and section two, three illustrative case studies providing student, staff and organisational perspectives on successful blended learning initiatives.

3.1. Online survey results

3.1.1. Participant demographics and context

Thirty-two participants from 16 countries and all continents completed the survey (Fig. 1). Most responses were from Hong Kong (n = 9), followed by Kenya (n = 5), Slovenia (n = 3), South Africa (n = 2), Poland (n = 2), with one each from Sri Lanka, Turkey, Uganda, Malta, United States of America (USA), Japan, Canada, Australia, Nigeria, United Arab Emirates (UAE), Slovenia/Ireland. Of 32 participants, 22 (68.8%) were nursing lecturers, 1 (3.3%) a PhD student and 8 (25.2%) practitioners, of which 7 (21.9%) were practising nursing and 1 (3.3%) nursing and midwifery. Eighteen reported experience of blended learning in nursing only, with much fewer (n = 6) in nursing and midwifery programmes.

3.1.2. Types of blended learning

Table 1 details the types of blended learning used. Twenty-four (75%) participants reported online learning was integrated in traditional/on-campus programmes. These represented 11 countries (number of responses in brackets): Hong Kong (7), Kenya (5), Slovenia (3), South Africa (2), and 1 each from Japan, Malta, Nigeria, Sri Lanka, UAE, Uganda, and USA. Five participants (Australia, Canada, Hong Kong, Poland, Slovenia) reported using fully blended learning programmes and a further three (Hong Kong, Poland, Turkey) the use of blended learning in other, unspecified ways. Fig. 2.

Of 24 participants reporting using integrated online learning as part of traditional/on-campus programmes, six provided examples; namely Microsoft Teams (P11), 'flipped classroom'(P3, P5), video (P15; P20), case scenarios, supplementary materials (P3), Moodle (P7) and '*an e-learning portal (P11)*'. Of five participants using fully blended learning, only USA provided examples such as "*discussion board" and "zoom" (P15)*.

3.1.3. Benefits of Blended Learning

Twenty-seven participants identified benefits of blended learning, for example that it was innovative and flexible, particularly in accommodating students' individual learning needs by supporting: "*Diversity in learning approaches (P12)*" and "*Enhanced flexibility and access*" (P15).

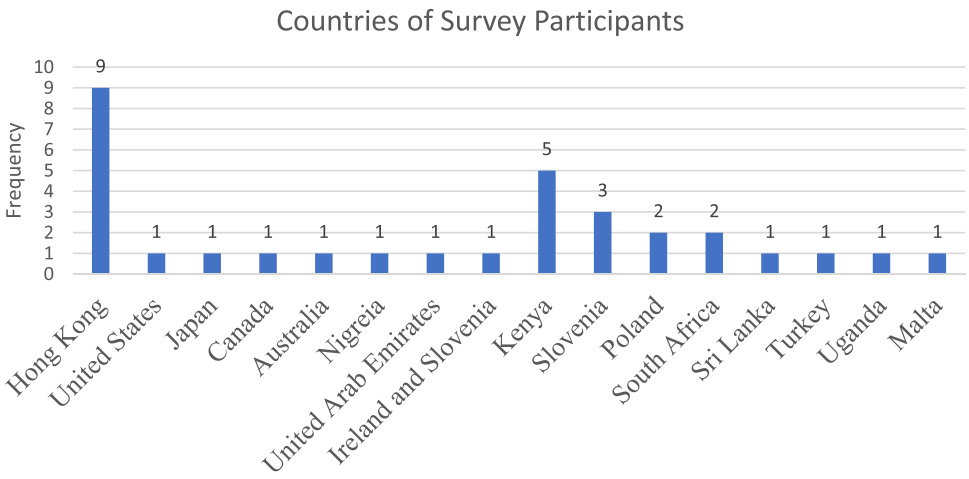

Fig. 1. Survey participants by country.

Table 1
Types of Blended Learning.

Types of Blended Learning	Total no. responses	No. responses by country
Integrated as part of traditional/face-to-face programmes(s)	24	Hong Kong (7), Kenya (5), Slovenia (3), South Africa (2), USA (1), Nigeria (1), UAE (1), Uganda (1), Japan (1), Sri Lanka (1), Malta (1)
Fully blended learning programme(s)	5	Australia Canada Hong Kong Poland Slovenia
Others (not specified)	3	Hong Kong, Poland, Turkey

Participants also commented that blended learning resulted in higher levels of student engagement in and outside class as it:

"*Saves time for travel and motivates students' participation in class.*" (P23)

"*.enhances communication and interaction outside classroom.*(P3)"

This helps "*create confidence and skills mastery" (P17),* "*promotes independent learning (P18)"* and "*bridges the gap between theory and practice P20)"*, for example by "*encouraging nurses and midwives to become computer literate (P26).*" Contextual benefits highlighted included the key role blended learning played in enabling continuity during emergencies like the Covid-19 pandemic.

Participants expressed mixed views on the relative cost of blended learning. Though 24 (75%) considered it cheaper than traditional programmes, opinions varied on magnitude, ranging from *'50% cheaper'* (Poland) to '*a fraction cheaper*' (UAE). Though the majority thought blended learning would effect future savings, making it *'cost-effective'* (Canada), two participants perceived it as expensive, particularly when set-up costs were included. Participants also highlighted the potential savings blended learning offered students, from reduced travel and subsistence costs for example, though recognised this needs balancing against extra costs, including computer equipment and internet access.

3.1.4. Challenges of blended learning and how these were addressed

Only two of 32 survey participants specified challenges associated with blended learning, citing: "*Extra time and effort in preparing multimedia materials (P8).*" and "*Issues creating an effective self-spaced learning environment*" (P15).

A further 15 however indicated how institutions were successfully addressing such challenges. Responses focused mostly on adequately preparing students/staff and pro-actively managing the blended learning process. Access to well developed, reliable digital infrastructure was considered crucial; this included a function-rich, integrated, learning platform, relevant hardware, software and connectivity. Participants also emphasised supporting student and staff digital skills development, warning against assuming prior capability and cautioning that ongoing technical support for both groups was also crucial.

Participants highlighted the importance of facilitating student involvement in blended learning. Supporting students' preparation and general time management using early announcements, reminders; monitoring of attendance and participation, and: *"Provision of starter pack and IT support (P22)",* along with direct instructions were all methods used to support student engagement. Student forums, early small-group online discussions in class, and recorded materials were also

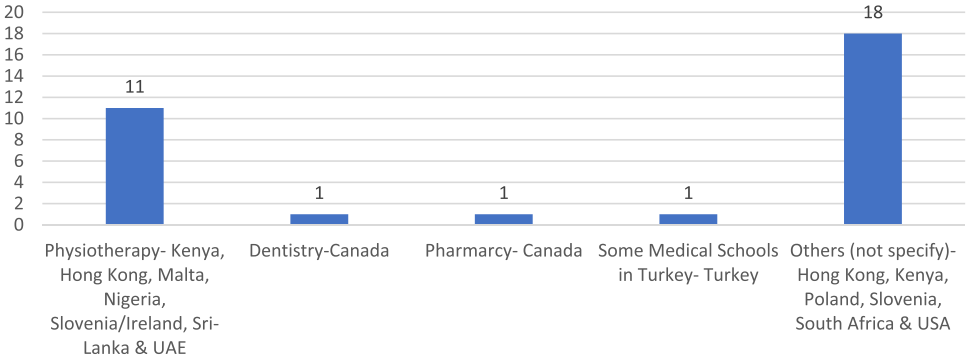

Fig. 2. Other Pre-registration programmes using blended learning.

used to engage students. Recorded lectures reduced the impact of unstable internet services by enabling students to catch up when connectivity resumed.

3.1.5. Other Pre-registration programmes using blended learning

When asked to indicate if they were aware of other pre-registration programmes that used blended learning for students in the professions allied to medicine eleven (34.4%) participants from eight countries (Hong Kong, Kenya, Malta, Nigeria, Slovenia/Ireland, Sri-Lanka, UAE) reported its use in physiotherapy, one (3.1%) in dentistry, one (3.1%) in pharmacy (both Canada), one (3.1.%) some medical schools in Turkey. A further 18 (56.3%) from six countries (Hong Kong, Kenya, Poland, Slovenia, South Africa, USA) reported others without specifying the discipline.

3.2. Case studies

Though 27 survey participants identified benefits of blended learning, only seven provided specific examples of success in their responses to the survey. We followed up all seven but only three were reachable using the contact details they gave despite multiple attempts. These three provided further information via a telephone call, resulting in the three case studies reported here (see supplementary file 2 for full case studies). These were not designed to be representative but rather to provide some additional insight to participant experiences reported in the survey for wider learning. The first, 'Learning to Learn Module' uses blended learning to prepare students for transition into pre-registration nursing and other programmes. The second is a staff perspective on the well-established use of this approach and new learning from switching to wholly online learning during Covid-19; the third provides a student perspective on a blended learning bridging programme for nurses.

3.2.1. Case study 1 summary: Learning to learn module (Ireland/Slovenia)

This module has been part of the pre-registration nursing curriculum for Year 1 B.Sc.(Hons) Nursing at Waterford Institute of Technology, Ireland since 2008 and technology enhanced learning (TEL) strategy in preparation for online learning at the University of Maribor, Slovenia since 2016/17.

3.2.1.1. Format. Continuously assessed, core five credit, blended learning module spanning four months with cohorts of 100 + students from three nursing fields. The online component is asynchronous, comprising 22% of the learning hours; the remainder is laboratory and Enquiry Based Learning.

Module philosophy and design are based on multiple intelligences (MI) theory and the multiple intelligence teaching approach (MITA), a framework for operationalising MI. MI theory posits that individuals have multiple intelligences which can be harnessed and developed, though linguistic and logical-mathematical intelligences are usually dominant. A MITA framework facilitates learning for understanding for all students' intellectual dispositions/abilities. A strengths-based, experiential, and active-learning approach, MITA involves five phases to facilitate students' learning using their own individual mix of intelligences. Its suitability for reinforcing academic learning in support of students' wider professional and clinical development is particularly relevant. Denny et al. (2008) outlines the opportunities this approach presents for nursing education.

3.2.1.2. Outcomes. Student evaluations were consistently very positive. Students particularly valued the online self-assessment activities. Having their learning styles and MI assessed enabled them to combine profiles, which positively influenced their approach to learning. Although the MIDAS screening tool attracts a cost per student, these activities were considered good value for money as they resulted in students thinking differently about how they learned and engaged with learning. Students also applied this new insight in practice, for example, in thinking about how to engage and communicate differently with patients.

'Top tips' from the team:

- Avoid the didactic approach online learning lends itself to
- Technology must be the servant of the student/learning facilitator
- Online learning can have huge advantages for students
- We need to lead/motivate students into reading and periods of concentrated effort, not just expect it;
- Recognise additional 'upfront' costs of blended learning
- Teaching staff development is needed to cultivate the necessary skillset and adjustment to new way of working
- Students miss the social aspect of learning
- Transparent monitoring of attendance via online platform is crucial
- Use reflective online activities at the end of each session and the educator identifies next steps
- Use two-footed questions (MITA Phase 1) in online activities to promote critical thinking

3.2.2. Case study 2 summary: Pre-pandemic blended learning and learning from Covid-19 (Malta)

This case study represents the Nurse Lecturer experiences of blended learning based nursing programmes before and during the Covid-19 pandemic.

3.2.2.1. Context. Established blended, pre-registration education for cohorts of 100 + nursing students, using a Virtual Learning Environment. The aim was never to replace face-to-face teaching but use virtual aids as additional learning tools.

Though extensive student and staff travel was generally not necessary, blended learning alleviated the negative impact of urbanisation i.e. densely populated country with relatively poor infrastructure. Issues included unreliable public transport, limited pedestrian safety, traffic congestion and insufficient parking; blended learning brought benefits for students and staff by reducing the stress associated with these.

A long-standing university directive to develop blended learning and good take-up by nurse lecturers meant they were ahead, adopting this approach before Covid-19. Moodle was used to facilitate recorded sessions, pre and post session information sharing and discussion; 'flipped classroom' using small group-work and an e-portfolio helped students take charge of their learning. However, despite the benefits of blended learning some staff still resisted its increased use.

3.2.2.2. Impact of Covid-19. The pandemic caused a total shift online and increased use of simulation (including for clinical skills). This shift made visible previously unrecognised difficulties some students faced. These included lack of access to personal study space whilst living in an orphanage, dependants requiring care and lack of hardware or money for internet access. Such issues affected a minority of students and could have been missed pre-pandemic, only becoming visible following the reduction in student access to on-campus online learning facilities. The university responded by loaning computers, although students were not fee-paying and already received a stipend to support educational needs.

Facilitating online learning affected teaching practice as illustrated in Table 2.

3.2.2.3. Lessons learned.

- universities cannot take for granted IT access and attractiveness of blended learning for staff
- facilitating online learning requires developing new capabilities (students and staff)

Table 2
Advantages and challenges of BL (case study 2).

Advantages	Challenges
changes in 'classroom' management needs i.e. reduced disruption	more difficult to identify and address student disengagement when teaching online
increased student engagement; with tutorial and welfare appointments, feedback on draft work	tutors compensated for reduced student contact/informal accessibility e.g. increased reviewing of assessment plans and tutorials
reduced staff stress associated with organisational processes e.g. finding/booking tutorial rooms, increased autonomy and ease in supporting student need	reduced opportunities for students to access informal help from staff and peers
increased tolerance (staff and students during Covid-19)	small group learning online – requires programme and staff restructuring difficult to know how students are responding to/evaluating online learning – potential loss of personal contact and collaborative teamwork (including student/staff)
online learning infrastructure largely in place - an important advantage	loss of non-verbal context makes interaction more difficult reduced informal collegial support and contact

- Blended learning has advantages for urban as well as rural student/staff populations

- need to better understand how simulated learning and practical skills assessment affects learning and competence.

3.2.3. Case Study 3 summary: Case study 3: Bridging programme for internationally educated nurses (Canada)

This case study represents a student experience of a mandatory blended learning programme that nurses educated elsewhere complete for Canadian Registration.

3.2.3.1. Format. A 9–12 month programme to support safe and effective integration of nurses initially registered and with experience of working in other countries into the Canadian system. Participants are predominantly mature, with experience in non-Canadian healthcare settings. Continuing competence assessment is used to assess capability and identify further learning needs, with additional learning e.g. pharmacology, mandated where necessary. The programme is predominantly online with approximately weekly face-to-face sessions for practical skills development and assessment. It includes synchronous and asynchronous learning using a virtual learning environment for cohorts of approximately 20 students. The advantages and challenges identified are outlined in Table 3.

3.2.3.2. Local context. Access to home computer and/or smartphone is widespread and the target student group consider internet connectivity/WIFI a lifestyle necessity. The university also provides good access to on-campus computer facilities 24hr per day at least six days per week and the students are highly motived i.e. seeking Canadian registration.

4. Discussion

This study explored the role of blended learning in preparing nursing and midwifery students for initial professional registration using international nursing and midwifery leader networks and experiences, to inform education policy in the UK and elsewhere. Case studies developed from examples of successful blended learning reported in the survey were developed to supplement the survey responses by providing more in-depth, contextualised information to enable transferable learning.

Table 3
Advantages and challenges of BL (case study 3).

Advantages	Challenges
Improved access	Risk of distractions and interruptions –requires good self-management skills and motivation
Flexibility – enables ability to study alongside other responsibilities	Potential isolation and lack of interaction with peers – mitigated by mandatory small group work and collaborative online learning and assessment. Students also set up their own mechanisms for small group interaction e.g. using social media and informal peer networks
Sense of independence – planning own time and learning within boundaries	Potential reduced interaction with staff and opportunities for informal instruction. Tutor availability within 48hrs via telephone or other means became even more important
Reduced cost – e.g. travel, time, on campus sustenance	Increased workload e.g. multiple quizzes and assessments on top of other study tasks, could be overwhelming at times.
Greater autonomy over study environment –self organised to support personal learning preferences, enhancing learning	

The results indicate 75% participants reported using blended learning as part of traditional/on-campus programmes, whilst 15.6% mentioned fully blended learning. This reflects the broader context as whilst digital teaching and learning will remain widespread not all learning is or should be online (Anon, 2020). Overall, our results indicate that blended learning can offer advantages over a purely face-to-face or e-learning model as the study found many positive effects of this approach on student learning. As case study 1 illustrates however, success requires effective preparation of staff and students.

The role of blended learning in increasing access, by supporting student learning in remote locations for example, is unsurprising. Our results indicate however, that it can also successfully help alleviate the challenges of urbanisation with beneficial effects on staff and students, as Case Study 2 illustrates. Our participants reported that the flexibility blended learning offers increases access to study compared to traditional on campus formats. This includes enabling students to pace their own learning and engage in self-directed learning, promoting greater independence. This is consistent with Leidl et al. (2020), who reported increased flexibility and control over learning pace were advantages of blended learning. Our participants also reported that interactive blended learning can enhance student engagement, which enables independence and autonomy and in turn enhances student confidence and skills mastery. This finding is congruent with previous studies suggesting that blended learning is more likely than either face-to-face or e-learning alone to promote effective knowledge acquisition (Cobo-Rendón et al., 2022; Liu et al., 2016).

The flexibility and enhanced access blended learning offers is beneficial for students, teachers and institutions. Using online resources in a blended approach can enable students and lecturers to tailor content and how it is used to fit learning style, topic and context. This includes enabling students to revisit lectures and other learning materials; supporting student engagement and deep learning, which enhances learning performance. These results echoed multiple studies, including for example Westerlaken et al. (2019) who report not only the increased flexibility blended learning provides for teaching and learning, but also students' appreciation of being able to study at their own pace alongside other responsibilities. This is important for enabling wider access to the healthcare professions as one response to the unrelenting increase in the demand for care and workforce shortages facing health organisations (Topol, 2019). Case Study 3 illustrates the student perspective on this. Some participants in our study also reported better student outcomes, mirroring previous reports of the positive effect of virtual education on

midwifery (Mohamadi-Bolbanabad et al., 2019) and nursing (Kang and Kim, 2021) students' knowledge along with the potential for driving education experience and outcomes if harnessed strategically (Barber, 2020). This is unsurprising given the potential for tailoring learning to and by the individual and deep learning that a blended approach offers (Topol, 2019).

As case study 2 illustrates however, we must prevent disadvantaging students by being complacent about off-campus access to the appropriate study environment, equipment and connectivity, even where there is widespread societal digital access. These needs may be hidden but must be recognised and addressed to enable successful student engagement with blended learning. We found many examples of institutions who are achieving this, supporting claims from Hall and Villareal (2015) that supporting independent student learning is connected to student success.

The potential impact of blended learning on tutor/student and student/student interaction we found, and the strategies participants identified for mitigating this such as chat rooms, discussion boards and the 'flipped classroom' mirror those in the literature. Kang and Kim (2021) found the 'flipped classroom' approach enhanced students' knowledge, problem-solving ability and learning satisfaction compared to traditional lecture-based methods. Though not exclusive to online teaching, a 'flipped classroom' inverts the conventions of traditional learning to enable dynamic, interactive learning environment creation during class time. This finding reflects many previous studies; for example, a study with postgraduates highlighted that using interactive blended learning methods may increase perceived learning effectiveness and satisfaction (Westerlaken et al., 2019).

Creating rich, interactive, self-paced learning environments is not easy however. There is recognition that technology cannot just be an add-on to existing teaching material in an attempt to replicate but requires appropriately designed pedagogy, curriculum and assessment that is inclusive and based on an understanding of how students learn (Barber, 2020) There is also recognition that institutions need to provide pedagogic as well as technological support to ensure the appropriate integration of technology to maximise student learning (Cobo-Rendón et al., 2022) Case Study 1 recognises the necessity of addressing this to help reverse the reticence of some staff to engage with blended learning and illustrates that staff also need ongoing support in developing the necessary techno-pedagogic skills to effectively engage with blended learning (Jowsey et al., 2020).

The relative cost of blended learning was commonly referred to by participants though their perceptions, including the magnitude of savings, varied and none indicated what data their response was based on. Jowsey et al. (2020) found comprehensive evidence of the efficiency of blended learning for pre-registration nursing programmes. This supported previous work by Lothridge et al. (2013) who found delivering traditional face-to-face forensic science training cost roughly double that of a blended model; explaining the difference in terms of additional instruction time, facilitator salaries, physical space, equipment, and supplies. Our participants adopted a broad view of costs for students and staff, referring also to the time saving and stress reduction associated with reduced travel for example when compared to face-to-face programmes, though such factors may be more difficult to quantify. In addition, our participants reported staff mitigating the reduced social contact and potential isolation of students associated with blended learning. They proactively facilitated student networks and groups and offered extra tutorial support/feedback on draft work to compensate for the reduction in informal opportunities students had to interact with and ask questions of tutors e.g. before and after lectures, 'dropping by staff offices' etc. Case Study 2 illustrates this, however such additional staff work is relatively invisible. Thus, adopting a multi-stakeholder approach to cost/benefit evaluation of blended learning, that takes account of country and organisational differences in how it is used and how costs and benefits are calculated would ensure key factors and any hidden or shifting of costs, for example, of computer and internet access costs from institution to student, are considered. This may also help address the continuing perception of some students that blended learning is of lesser value and effectiveness.

4.1. Limitations

The study was exploratory and used purposive snowball sampling therefore the results are not generalisable or representative. Participation was voluntary with potential for bias as individuals with extreme viewpoints may have been more likely to respond, further participants' interpretation of the term blended learning was not explored and only one identified as a midwife though a number reported experience of nursing and midwifery programmes. The volume of responses from each country was relatively small, though the number of countries and contexts involved was substantial and participants had previously been independently recognised as nursing and midwifery leaders with a breadth of relevant experience. Finally, the data collection tool, developed specifically for this study, had not previously been validated, though piloting maximised usability and clarity.

4.2. Implications for practice

The potential benefits of blended learning for all stakeholders are clear but equally clear is the need to give appropriate attention to enabling students and staff to develop the skillset necessary to realise these. This includes ensuring reliable access to the appropriate equipment and connectivity for all. In addition, greater understanding of student perceptions that online learning is of lesser value and effectiveness is needed; though not universal, such views persist. Finally, evaluation of the costs and wider benefits of blended learning requires a multi-stakeholder, contextualised perspective and exploratory methods to uncover potentially 'hidden' factors and impact.

5. Conclusions

This study confirms the global use of blended learning in educating pre-registration nurses and other healthcare professionals. We found congruence in the nursing and midwifery leaders' survey responses both within and between countries. We also found a high level of resonance between the survey results and the case studies, and between the study results and the broader literature.

The study successfully yielded a range of international nursing and midwifery leader perspectives on blended learning. The results demonstrate that it offers recognised benefits for students, staff and organisations, though the number of specific, successful examples contributed by participants from practice was limited. Despite blended learning also being associated with significant challenges for all stakeholders, this study found many examples of how these are being successfully addressed. Thus, whilst it offers a potentially useful tool for nursing and midwifery education policymakers seeking to address the challenge of the need for an expanded nursing workforce that is fit for contemporary care delivery, gaps persist in the current evidence regarding the practice and potential impact of this learning approach.

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CRediT authorship contributions statement

Gillian Janes: Conceptualisation, Methodology, Validation, Formal analysis, Investigation, Resources, Writing – original draft & final editing, Project administration, Funding acquisition. **Mandu Ekpenyong:** Software, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – original draft & editing. **Henrietta Mbeah-Bankas:**

Conceptualisation, Validation, Writing – review & editing. **Laura Serrant:** Conceptualisation, Methodology, Writing – review & editing.

Declaration of Competing Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Anonymised data is available on request from the corresponding author.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.nepr.2022.103514.

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