

# **Blended Learning in Practice**

Spring 2024

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## Editorial

Welcome to the Spring 2024 edition of our e-journal Blended Learning in Practice. In this edition we have nine research articles from participants on the Post Graduate Certificate in Learning and Teaching in Higher Education Programme at the University of Hertfordshire.

In this edition:

Wuraola Bolaji explores trauma-informed pedagogy (TIP) and its impact on the learning experiences of social work students within the UK post 1992 university setting. The study sheds light on the detrimental effects of trauma on learning, establishing it as a potent predictor of academic failure. While the adoption of trauma-informed pedagogy is gaining traction in higher education, its application within social work education remains relatively underexplored.

Ioannis Dimitrakopoulos examines the impact of OpenAl's ChatGPT on Higher Education learning and teaching, with a specific focus on Criminology curricula and the interplay of Critical Pedagogy, Active Learning, and Assessment as Learning (AaL) approaches. The article proposes an innovative approach to enhance critical skills development in learners through AaL and Artificial Intelligence (AI), underscoring the need for integrating tools, such as ChatGPT, with constructivist educational practices.

Danilo Faccenda investigates the potential role of artificial intelligence (AI)-based tools for researchers in supporting the development of advanced reading skills and conceptual knowledge in international students.

Viji Jayasundara discusses how, group work has become a key challenge In Higher Education (HE) in terms of students' engagement. This study is aimed exploring challenges associated with group work and strategies to overcome them from the perspectives of staff and students of the Hertfordshire Business School at the University of Hertfordshire to better facilitate students to engage in group work

Kusum Kapur explores the Flipped Classroom This article examines the impact of pre-class learning and teaching strategies on nursing student engagement. A student survey collected responses from 33 pre-registration nursing students to explore students' experiences in accessing and interacting with educational materials. The article provides recommendations for improving the teaching and learning process and offers suggestions on how to enhance overall student engagement.

David Lacy investigates determine the accessibility of online resources for a module within an occupational therapy degree apprenticeship. The study found that although many resources were compliant with accessibility guidelines there were notable omissions, particularly for provision of media in alternative formats. He also provides recommendations for accessibility informed by this study and by Activity Theory. Akushla Senarath Rathnayake has carried out a study aimed to explore the students' experience of learning anatomy in Year One of a Physiotherapy undergraduate programme, using the Anatomy Learning Experiences Questionnaire (ALEQ), adapted for physiotherapy students. The students expressed positive perceptions of several learning activities, including using images, online quizzes, and the Internet. However, there was a prevalent opinion that the sheer volume of content to be learned was daunting, although, they recognised the significance of anatomy in the context of future clinical practice.

Angela Traill looks at the Supply Chain and Manufacturing Management Programme, a oneyear Masters course run by the School of Physics, Engineering and Computer Science at the University of Hertfordshire, which does not presently include formal development of so called 'soft skills', such as communications, collaboration and teamworking. This paper proposes an activity-based teaching and learning experience for the development of teamworking skills, the design of which is grounded in the pedagogy relating to activity based, experiential and compassionate learning.

Kim Tran addresses the challenges of teaching and learning for older students, aiming to propose an approach that enhance their learning experience and learning outcomes. Her study reviews existing literature, using a systematic approach to literature search and data analysis, to obtain understanding of how adult intelligence development intertwines with the learning process. Kim reveals that, to optimize outcomes for students of varying ages, universities must first acknowledge the impact of age, formal education and intelligence on students' learning ability, thereby influencing the overall learning experience and performance. Kim advocates for the integration of adult intelligence theories, into the design and implementation of approaches suitable for students of diverse age, particularly for older students, to empower them to achieve academic outcomes on par with their younger counterparts.



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Wuraola is a Senior Lecturer in Social Work at the University of Hertfordshire. She is an FHEA and a psychoanalytically trained Doctor of Social Work. Her research interests are broadly around trauma-informed pedagogy, care-experienced students in higher education and international students, refugees, and asylum seekers. Wuraola completed her Doctorate at the Tavistock and Portman NHS Trust on trauma and transitions to adulthood of care leavers who are refugees or asylum seekers. Wuraola's research is available here:

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Danilo is a Lecturer in Biochemistry with a strong interest in mitochondrial signalling and homeostasis. The focus of his current research is the characterisation of mitochondrial stress pathways in age-related diseases. After completing a PhD (University of London) in Mitochondrial Cell Biology and Pharmacology in 2016, Danilo worked as postdoctoral researcher for seven years to investigate the role of various mitochondrial proteins in cancer and neurodegeneration. Danilo took up a lectureship at the University of Hertfordshire in 2023.

#### Viji Jayasundara

Viji is an Employer Liaison Tutor in the Hertfordshire Business School and has been active in scholastic research since 2011. She completed her PhD in Developing Cognitive Skills of Compassionate Communication for Online Group Work Management in 2023. She was previously Head of the Department of English Language Teaching at the Uva Wellassa University of Sri Lanka. Viji is passionate about research informed teaching in academia to enhance student engagement and student experience in their academic journeys.

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David is an Occupational Therapist and Senior Lecturer with the programme BSc (Hons) Occupational Therapy (degree apprenticeship). After over 20 years of practice in occupational therapy, primarily working with disabled adults in their homes, David moved to working in the education of occupational therapy apprentices. This involves supporting the learning of apprentices both within university study and their workplaces. He is module leader for a range of modules. David has interests in technology-enhanced learning, the psychology of education, and the development of degree apprenticeships.

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Akushla is a Senior Lecturer in Physiotherapy and is a Chartered Physiotherapist. Previously Akushla secured a research studentship with Versus Arthritis, culminating in the successful completion of her PhD (Cardiff) in 2023. She has also won other several awards and scholarships including the Commonwealth Scholarship which enabled her to complete a Master of Science in Advanced Neuro-Musculoskeletal Physiotherapy from King's College London in 2017. Akushla joined the University of Hertfordshire as a Senior Lecturer in 2022. Her current research interests encompass undergraduate medical education and low back pain self-management



#### Angela Traill



Angela is a lecturer in the School of Physics, Engineering and Computer Science. at the University of Hertfordshire. She teaches elements of Supply Chain Management, Procurement and Logistics. Angela has a PhD from the University of London. and has had a long career in transport policy and public affairs in the UK and Europe, including a period with Innovate UK, leading the freight and logistics team on numerous funded projects

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# Enhancing Social Work Curricula through Trauma-Informed Pedagogy Towards Potential and Impact

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### Abstract

This research explores trauma-informed pedagogy (TIP) and its impact on the learning experiences of social work students within the UK post 1992 university setting. Recognising the heightened awareness of universities regarding the pervasive influence of trauma on learning, particularly in the aftermath of the COVID-19 pandemic, this study focuses on social work students who exhibit a disproportionately higher incidence of adverse childhood experiences and trauma exposure compared to the general population.

The study sheds light on the detrimental effects of trauma on learning, establishing it as a potent predictor of academic failure. While the adoption of trauma-informed pedagogy is gaining traction in higher education, its application within social work education remains relatively underexplored. In collaboration with final-year MSc and BSc social work students at the University of Hertfordshire (UH), this study employs in-depth interviews to gather insights.

The findings of this study underscore the positive influence of TIP on students' learning experiences. TIP cultivates a sense of safety and deepens students' understanding of trauma, ultimately enhancing their academic performance and preparing them for effective professional practice. Recommendations for the future include the integration of TIP into social work and other disciplines' curricula within universities. Also, developing training programs for educators to implement TIP strategies effectively. This will contribute to social work students' overall well-being and academic success and foster a more inclusive and supportive learning environment across various academic disciplines.

## Introduction

Social work education faces a profound quandary, as eloquently articulated by Ko et al., (2008): 'how to balance their primary mission of education with the reality that many students need help in dealing with traumatic stress to attend regularly and engage in the learning process' (p. 398). In my capacity as a Module Leader for MSc and BSc social work programmes, I am consistently confronted with distressing student experiences where trauma emerges as a pervasive force. Cunningham (2004) notes a high prevalence of adverse childhood experiences (ACE), leading to trauma among individuals, a phenomenon particularly pronounced among social work students who often arrive at university as 'wounded healers' (Newcomb et al., 2015). These individuals are driven by a desire to heal their trauma by aiding others (Murphy, 2022).

Compounding the issue is the prevalence of trauma exposure among the vulnerable groups served by social workers (McKenzie-Mohr, 2004). A key recommendation of the final analysis of serious case reviews (2017-2019) is for social workers to understand the impact of trauma (Dickens et al., 2022). Carello and Butler (2015) underscore the risk of vicarious trauma affecting all students, regardless of their trauma history. This critical juncture demands a closer examination of pedagogic practices, emphasising the imperative to address the impact of traumas on students' mental health. The tragic cases of Natasha Abrahart at the University of Bristol in 2018 and Romily Ulvestad at the University of Edinburgh in 2021 serve as poignant reminders of the consequences of inadequate support for students facing mental health challenges. The courts ruled that these universities had not made reasonable adjustments to accommodate the known mental health issues of the students, highlighting a dire need for a holistic response to such challenges.

While these cases were not specific to social work students, the resonance is undeniable, emphasising the urgency of research into TIP. Natasha Abrahart's unfortunate demise on the day of a scheduled presentation and Romily Ulvestad's tragic suicide underscore the profound impact of academic stress and inadequate institutional support. The desperate plea from Romily Ulvestad's mother serves as a stark warning: "I tell all my friends, don't send your child to university and think they will be taken care of" (Weale and Baldwin, 2021). This poignant statement underscores the pressing need for universities, especially those with social work programs, to embrace trauma-informed pedagogy.

TIP emerges as a responsive strategy to mitigate the impact of trauma on social work students and to prepare them for practice. Recognising the pervasive influence of trauma and endeavouring to minimise vicarious trauma and re-traumatisation become paramount in fostering a conducive learning environment (Sander, 2019). While social work is a profoundly rewarding profession, it inherently involves elevated stress levels associated with addressing the trauma and suffering of service users (Rantonen et al., 2017).

This study aims to investigate the urgent necessity of TIP, especially within the context of social work education, offering insights into practices that can both support students and enhance their capacity to navigate the demands of this challenging profession.

## Rationale

Social work educators are battling the complexities of educating a population at high risk of secondary trauma, burnout, and a history of personal trauma. The profession is in crisis concerning the recruitment and retention of social workers (DFE, 2022). It is unsurprising that Local Authorities placed recruiting high-quality social staff as the top priority for improvement over the next three years (see Figure 1).



## Figure 1: Local Authorities' top priorities for improvement (Kalsi et al., 2022)

For this priority to be met, higher education Institutions (HEI) must train highly skilled and resilient social workers to meet the challenges of working with traumatised populations. The dearth of research on the potential and impact of TIP for social work education and practice must also be addressed urgently.

## Significance to social work practice

The findings of this study provide valuable insight into the impact and potential of TIP in social work departments within HEI. It provides insight into students' experience of TIP and aid decisions in policies and provisions to support the student's learning. The new government vision to transform Children social care prioritises the specialist training of social workers, including developing key skills on the impact of trauma and trauma-informed practice (DfE, 2023). However, the delay in implementing these is disturbing for a system deemed 'unfit for purpose' (Commission on Young Lives, 2021). While this is a small-scale study, it could help more HEIs to take active steps to implement TIP in delivering an effective social work education and better prepare students for practice.

## Literature review

TIP is employed here as the theoretical framework to the questions posed. First, trauma is defined to provide a conceptual backdrop to the questions.

## What is trauma?

Although commonly used in everyday life, the word trauma is complex and a rather nebulous term. Trauma originates from the Greek word 'wound' (Kolaitis and Olff, 2015). Its definition by the Substance Abuse and Mental Health Services Association (SAMHSA, 2014) is popular among scholars. SAMSHA defines trauma as: An event, series of events, or set of circumstances that is experienced by an individual as physically or emotionally harmful or life-threatening and that has lasting adverse effects on the individual's functioning and mental, physical, social, emotional, or spiritual well-being (SAMHSA, 2014, p.7).

However, this definition overemphasises the individual experience and fails to account for the role of invisible structural factors. Hence, trauma in this study is defined as:

Event(s) experienced by individual(s) to be highly distressing, emotionally or physically harmful or life-threatening and that have a lasting impact on the individual's well-being, how they function, relate to others and see the world (Bolaji, 2022).

Trauma's impact is experienced differently by individuals depending on variables (van der Kolk, 2014).

Theoretical framework - Trauma-informed pedagogy (TIP)

TIP is grounded in trauma-informed practice and the Universal Design for Learning (UDL) (CAST, 2018). It is guided by the key elements and principles in Figure 2.



Figure 2: Trauma-informed elements and principles (SAMSHA, 2014)

Conversations about what trauma-informed means have increased in HE in recent years and much of this conversation is from social work education (Carello and Butler, 2015). While TIP has been used successfully in primary and secondary schools (Harper and Neubauer, 2021), HE's pace is much slower. Although trauma-informed care, practice, teaching, and pedagogy are sometimes used interchangeably, scholars generally agree on what TIP is. They emphasise the need to understand the impact of trauma, use that understanding to

inform policies and practice and avoid re-traumatisation (Harris and Fallot, 2001; Carello and Butler, 2015; Harrison et al., 2019). TIP recognises that students cannot be separated from their life experiences (Arbour et al., 2023). TIP is not blaming these students. It is about making them feel understood, valued, and supported.

Most literature on TIP is on teaching and is from developed Western countries, more significantly, the United States (Knight, 2018). The impact of this is seen in the limited attention to the cultural issues in literature. Numerous social work Educators have called for and shared strategies to support TIP (Li et al., 2019; Sherwood et al., 2021; Carrello and Butler, 2013). However, Educators must have an insight into their trauma to support these students effectively (Bolaji, 2022) and pay attention to these cultural issues.

## TIP and social work students' learning experiences

There is consensus that TIP helps reduce risks, especially the risk of re-traumatisation (Cunningham, 2004; Carrello and Butler, 2013; Butler et al.,2016; Vasquez and Boel-Studt, 2017). It is an essential part of learning, and the first step is to 'do no harm'(Carrello and Butler, 2013). TIP aims to remove barriers as a result of traumatic experiences as it impacts students' performance. It supports diversity and inclusion by minimising the risks of traumatisation, especially minority students who are more impacted by racial trauma, Adverse childhood experiences and traumatic stress (Piper et al., 2022). Diversity and inclusion must include culturally informed practices at all higher education levels (Mattar, 2011).

TIP promotes the understanding of trauma (Becker-Blease, 2017; Bitanihirwe and Imad, 2023). This understanding helps inform practices and policies. We see this during the COVID-19 pandemic when HEIs adapted their teaching and assessment styles to meet the changing circumstances. Understanding trauma is key to assessment, decisions, and provisions these students will make in practice. That understanding must be backed by resilience to survive the challenges of social work (Grant and Kinman, 2012). Research with social work students on TIP confirms its capacity for promoting resilience. For example, Vasquez and Boel-Studt's (2017) research with undergraduate social work students concluded that TIP promotes resilience at undergraduate and post-qualifying levels. These results are similar to those reported by Palma-García and Hombrados-Melieta, (2014) in their research of 613 social work students and resilience, Zingarelli-Sweet, 2021 and Cavener and Lonbay, 2022. Resilience can be problematic if we neglect that resilience varies by culture (Raghavan and Sandanapitchai, 2020).

Another significant area where TIP supports these students' learning is safety. Although ample evidence indicates that TIP promotes a safe learning environment (Hooks,1994; Carello and Butler, 2013; Cavener and Lonbay, 2022), there are inconsistencies in the construction of that safety. For example, Carello and Butler (2013) attention is on emotional safety, while the Office for Health Improvement and Disparities, (2022) is from a wider frame of physical, psychological and emotional safety. This study aligns with the latter and is in congruence with (Piaget, 1936 and Maslow, 1970) that students are unlikely to learn in an unsafe environment.

Further, the principles of trauma-informed practice of safety, building trust and transparency, peer support, collaboration and mutuality, empowerment, work, choice, and attention to cultural, historical and gender issues (SAMSHA, 2014) provide further insight into how TIP can support these students' learning.

## TIP and preparation for social work practice

The alarming report by Social Work England (2023) that 5,335 social workers left the register during the 2021/2022 registration year, and 24.1% of these had only been qualified for less than one year, is a concern for social work education and practice. Social work students will leave the profession prematurely without adequate preparation to deal with the emotional and psychological challenges they will face in practice (Newell and Nelson-Gardell, 2014). Evidence suggests that social work students are prepared for practice when they experience TIP during their education (Stokes, 2022). Bussey's (2008) research on preparing social work students for practice concluded that the training helped the students provide trauma-informed services to service users. TIP encourages student/ Educator relationships (Lewis et al., 2022) and is a mitigating factor for students facing placement challenges (Bennett et al., 2008). Given the positive impact of TIP, further research is necessary to see the potential of TIP in supporting the retention of these students in social work. However, TIP cannot operate effectively in conditions of high staff turnover (Smith and Monteux, 2023). TIP is an organisational-wide issue, and urgent training is required for its effective implementation.

In conclusion, TIP has a promising potential and impact on social work education. Social work students are prepared for practice due to the support it offers. For these potentials to be fully met, TIP must be culturally relevant, and recruitment and retention issues addressed. Further research on TIP is needed urgently.

## Methodology

Qualitative data aligns with the study's aim of seeking an understanding of the impact and potential of an experience (TIP). Qualitative method is exploratory (Lincoln and Guba, 1985) and useful for probing and clarifying issues (Bolderston, 2012). One-to-one interview was considered but discounted given the short turnaround of the study. The focus group interview employed is a time-saving and effective means of gathering data (Bolderston, 2012). It allows groups to reflect (Clarke, 1999). The focus group interview was conducted online via Zoom for flexibility. Thematic analysis was employed to analyse the data because it helps with the identification of themes in data. The interview was audio-recorded with the approval of the participants. Two open-ended questions posed were:

1. How can TIP support social work students' learning experiences at university?

## 2. How can TIP help prepare social work students for practice?

The data was transcribed verbatim and analysed thematically.

## Sampling

The purposive sample was from six MSc and BSc final-year social work students (four MSc and two BSc). Final-year students were interviewed because they have spent the longest time on their programmes. Although 69 final-year students were invited to the interview, most could not attend due to the study's short turnaround and the students' prior commitments.

## **Ethical approval**

Since data collection was specifically linked to module improvement and development, the University of Hertfordshire did not require ethical approval for this study.

## Findings and discussions

What I know about trauma is that the longer it is left, the deeper it becomes and probably the more difficult it becomes to manage. (Student 1)

# How can trauma-informed pedagogy support social work students' learning experiences at university?

The statement above by one of the students resonates with the construction of trauma as a wound and the need for TIP in social work education. If a wound is left untreated, it festers. In the same way, if the trauma of these students is not supported, it will impact their wellbeing and learning. The key findings about TIP and the student's learning experiences are that TIP makes the students feel supported and understood, improves performance, and makes them feel safe.

They felt that TIP provides support to deal with the trauma, this is encapsulated in the statement below:

*I think trauma-informed pedagogy helps to create a supportive and inclusive environment that fosters positive mental health and emotional well-being* (Student 1).

The support is university-wide and could include one or more lecturers, personal tutors, peers or the Student Well-being Service. A prerequisite to providing support for trauma-affected students is an understanding of trauma and its impact of trauma on student learning and development (Carello and Butler, 2015). One student felt TIP would:

.. help students. I can work towards the same goal with this university because they would give me the kind of support and the kind of encouragement that I need because .. they understand where I'm coming from. (Student 3)

The student felt that TIP aids the understanding and impact of trauma. A student stated that:

If a person needs extra time, deference, or extra weeks to take a course, you recognise that! This person may not be treated like every other student. So, they know you understand them. They are safe with you. So, you are empowering them in the middle of whatever they are going through or whatever their past is to fit in well. (Student 3)

TIP fosters non-discriminatory practice, a key component of UDL. Given that 34% / 35% of students enrolled on undergraduate and postgraduate social work programmes identify as 'global majority', compared to 27% average across all Higher education (Skills for Care, 2023), it is crucial that knowledge and understanding must be culturally sensitive.

When we have this knowledge of trauma-informed practice, it will go a long way in helping us understand the elements of trauma in people. It will help us come across, as non-discriminatory. (Student 2)

This resonates with Bitanihirwe and Imad's (2023) assertion that universities need to understand trauma and the variables that determine its impacts before developing culturally informed, equitable trauma-informed plans.

Furthermore, the students felt that TIP could help improve their performance. One student stated that: ...

Social work can be quite challenging and overwhelming. So, this kind of teaching approach would really go a long way in helping students achieve their potential. Yeah, both in the school and even on placement. (Student 6)

While this finding adds to previous findings about TIP and student performance, it is important to explore the construction of 'performance'. Performance is not solely about outcomes. It is also about individual learning pathways King-Hill (2015). While trauma disrupts individuals' sense of safety (Van der Kolk, 2014), the students felt that TIP encourages a sense of safety. Student 2 referred to TIP as a 'safe haven'. Other statements include TIP...

...creates a culture where students can feel safe and protected from trauma (Student 5)

.. is a safe environment. So, when you are in placement, you get the most out of it. You know, the safe network. (Student 6) Safety is a cornerstone of TIP. It ensures that adequate support is provided to students to become more adept in managing academic, social, and emotional challenges (Bitannihirwe and Imad, 2023). However, Educators and staff within HE must be trained to implement TIP effectively. When students feel safe, they are more likely to share their experiences with Educators. Safety motivates knowledge sharing (Siemsen et al., 2009). Safety encourages students to confront their biases, beliefs and values and be culturally competent (Holley and Steiner, 2005). Although the students' attention was on emotional and psychological safety, it extends beyond this. Safety includes the physical environment that the students operate in (Harris and Fallot, 2001). A safe physical environment is welcoming and organised, reduces triggers and avoids overstimulation (Hanover Research, 2019).

## How can trauma-informed pedagogy help prepare social work students for practice?

University education not only leads to a career but should be more focused on life beyond the university (Stewart, 2010). Given that stress and burnout are some of the challenges of the social work profession (Maddock, 2023), attention must be paid to post-qualified experiences if we are to make meaning of social work education. The students recognise the need to develop social work skills for complex and challenging social work practice. They felt that TIP helps prepare them for social work practice. It allows them to mirror their trauma-informed pedagogy experience on placement and in practice.

Knowing that you're getting support from your lecturers will allow you to learn, improve and reflect better. From that, you will hopefully be better prepared, going into social work itself. (Student 6)

Part of the preparation for practice is the skills and interventions (Domain 7, Professional Capabilities Framework (PCF) that these students must develop. This forms part of their continued professional development (Figure 3):



Figure 3: Social Work Professional Capabilities Framework (BASW, 2023)

The students also have to develop self-care skills, which promotes transformative learning (Lewis and King, 2019). Self-care skills help the students avoid secondary trauma and vicarious trauma in practice.

The students felt that TIP would help with their understanding of trauma. This supports previous research that TIP prioritise trauma understanding (Harper and Neubauer, 2021). Given that trauma is common, especially amongst social work service users, understanding trauma is key to the professional development of these students. This understanding aligns with social work PCF 5 (knowledge). Finally, the students felt that TIP helps to improve their practice as seen in the statement below:

You know, when you show people that you care, when you show people that they are safe when you demonstrate that you can be trusted, people are empowered to unleash the very potential that they have. It empowers them to go out there as social workers and do their very best. (Student 3).

Trauma-informed approaches improve people's experiences of services and enhance engagement (Department for Levelling Up, Housing and Communities, 2023). A traumainformed approach is significant when working with disadvantaged people (Department for Levelling Up, Housing and Communities, 2023), who constitute most social work service users.

## Limitations

This exploratory study's methodology involves a small focus group of six MSC and BSc social work students in a Western, developed country (UK) HEI and the participants are self-selecting. Hence, the findings may not be generalisable across all HEIs. Wider participants across social work HEIs in developed and developing countries could develop opportunities for triangulation. However, data generated from this study provides valuable insights into the potential and impact of TIP in enhancing social work curricula in HEIs.

While TIP is effective in enhancing social work curricula, it is not the panacea. Given the globalisation (Virag et al., 2022) and the growing diversity of the social work student population, TIP could be applied alongside inclusive pedagogy. Similar to TIP, inclusive pedagogy pays attention to differences among students and adapts teaching methods that take these differences into consideration (Dewsbury and Brame, 2019).

## Conclusions

The pivotal findings underscore TIP's multifaceted benefits, revealing its capacity to provide crucial support, enhance understanding of trauma and its repercussions, elevate student performance, and cultivate a profound sense of safety. Moreover, TIP emerges as a valuable preparatory tool, equipping students to navigate the complexities of their future professional practice.

The backdrop against which higher education institutions (HEIs) operate is marked by an intricate interplay of diverse student backgrounds, exacerbated by the compounding effects of the COVID-19 pandemic, societal upheavals, and a growing emphasis on trauma awareness. The resulting landscape is fraught with challenges, including heightened student anxieties and mental health difficulties, necessitating an immediate adaptation of pedagogical practices. While certain disciplines, like social work, nursing, and medicine, increasingly embrace trauma-informed approaches to cater to student needs (Sanders, 2021), the widespread implementation of such practices remains incomplete.

Patel et al., (2021) advocate for strategies to mitigate burnout among students in disciplines such as pharmacy and optometry and physician assistant programmes, positioning TIP as a viable solution. Notably, the study recognises that stress and burnout are leading causes of social workers exiting the profession, positioning TIP as a crucial preparation tool for navigating the challenges inherent in this field. However, the study identifies significant hurdles in implementing TIP, including the need for training and research on TIP in social work education and misunderstanding of trauma-impacted students. To ensure the success of TIP, these issues demand urgent attention.

## Recommendations

The study transcends its focus on social work, advocating for a broader application of its insights across various academic disciplines. The study's recommendation extends beyond social work, proposing that the pedagogical objective of preventing re-traumatisation and offering tailored support, grounded in understanding trauma's impact, can be extrapolated to benefit students in diverse disciplines within university settings. Ensuring that course content, policies, procedures, and support structures are consistent with the tenets of TIP will help these disciplines in the implementation of TIP. Thus, TIP's principles and practices emerge as valuable resources that can foster a more supportive and empathetic learning environment across academic disciplines. It calls for developing training programs for educators to implement TIP strategies effectively.

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# A Reflective Account on How Critical Thinking Can Be Enhanced by Integrating Artificial Intelligence in Learning and Teaching.

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### Abstract

This study examined the impact of OpenAI's ChatGPT on Higher Education learning and teaching, with a specific focus on Criminology curricula and the interplay of Critical Pedagogy, Active Learning, and Assessment as Learning (AaL) approaches. Employing a reflective methodology and grounded theory, this research assesses ChatGPT's capabilities and limitations by analysing its responses to two case studies from the 2022-2023 Hate Crime and Discrimination module against the established marking criteria. These findings reveal that ChatGPT demonstrates proficiency in content and structure yet exhibits certain limitations in critical thinking. Through the reflective account, the emphasis is on the essential role of critical thinking in academic pedagogy. The paper proposes an innovative approach to enhance critical skills development in learners through AaL and Artificial Intelligence (AI), underscoring the need for integrating tools, such as ChatGPT, with constructivist educational practices.

## Background

According to the International Society for the Scholarship of Teaching and Learning (ISSOTL), one of the five grand challenges in teaching and learning is to assist learners in becoming critical and creative thinkers (Capocchiano et al., 2023). Concerning critical thinkers (as both critical and creative are distinct but also complementary terms), it is suggested, through the relevant taxonomy, that the aim is for learners to be equipped with skills beneficial in approaching knowledge and through reflection/ thinking to accept or reject given truths (Ennis, 2011a; 2011b). In other words, closely to Socrates's questioning (e.g., Oyler and Romanelli, 2022) and Pierce's pragmatic theory of truth (e.g., Chiasson, 2005), it is a "mind habit" (AAC&U, n.d.) of evaluation and questioning of given concepts, which aims to a decision of acceptance or rejection.

Within the concept of Critical Pedagogy, many scholars have approached such theoretical and practical frameworks differently (e.g., Barton et al., 2010; Serrano et al., 2018; Gacek and McClanahan, 2021), although some do have as a map Freire's contributions (e.g., Corbett and Guilherme, 2021). Broadly, critical pedagogy imbued ideas from active learning and assessment authenticity and focused on the norms and practices in teaching that are not always compatible with the traditional practises of learning (Serrano et al., 2018). More specifically, it focuses on challenging techniques of the status quo in social, political, and practical concepts to equip learners with critical thinking (Stockdale, Sweeney and McCluskey Dean, 2021). Many scholars, who examine Critical Pedagogy and Active Learning, have focused on activities that can enhance the necessary critical skills, like critical thinking and critical reflection, for understanding complex social issues and being better equipped with appropriate professional skills (e.g., Barton et al., 2010; Howes, 2017; Kurtz et al., 2019). These skills like critical thinking, are core to the criminological curriculum and graduate attributes or professional identities, as outlined by both academics and the Benchmark statement for criminology (e.g., Crebert et al., 2004; Jameson, 2014; Quality Assurance Agency, 2018; QAA, 2022). It has been argued that case studies, as an evidential example of the above in practice, have been beneficial either as teaching activities or assessments, in developing critical thinking, applying theory into practice, and being reflective of situations that students may encounter in their later professional careers (e.g., Robinson, 2000; Cant and Cooper, 2009; Fisher, Esparza, and Olimpo, 2019; Ike, 2020).

Following the concepts of Critical Pedagogy, Active Learning, and critical skills necessary for the students and their professional development, an example found in the literature is that students should be taught to be critical when reading criminological sources and be able to challenge dynamics and given truths (Stockdale, Sweeney, and McCluskey Dean, 2021). In this sense, students should not be passive in learning by accepting given truths within the literature, but to be able to challenge forms of bias within them. Accordingly, here, it is proposed that students should be well-equipped with criticality and the appropriate skills to challenge given truths by AI (Artificial Intelligence)-generated responses. In the past year, more scholars have focused on AI and ChatGPT and its emergence within the education sector, especially commenting on the threats and benefits or standpoints derived from other professionals in the field of Higher Education (e.g., Sullivan, Kelly and McLaughlan, 2023). Most of the studies conducted so far have focused on a systematic literature review of pedagogy and ChatGPT/ AI (e.g., Memarian and Doleck, 2023; Rasul et al., 2023), while some have focused on its capabilities and limitations or concerns empirically (e.g., Firat, 2023; Khademi, 2023; Li and Zhang, 2023). One main concern outlined is that ChatGPT can pose a threat to academic integrity and learning as students may utilise such a tool for textgenerating responses in assessments or as a method to approach knowledge (e.g., Sullivan, Kelly and McLaughlan, 2023).

Following the Assessment as Learning (AaL) paradigm (Dann, 2014), and especially under the lens of constructivist learning theories (Dann, 2014), it is suggested, here, that the ISSOTL goal of developing critical thinkers could be approached through the active participation of learners in the assessment process through the usage of ChatGPT. Thus, in this article, the examination begins by assessing/ resolving actual case studies assessments from the 2022-2023 Hate Crime and Discrimination module (Level 6) through ChatGPT (3.5) to further understand its capabilities and limitations. Then, and most importantly to the objectives of the article, through a reflective account of the responses given and their evaluation (following a grounded theory approach), the discussion leads to the suggestion of an alternative, yet novel, approach in AaL by using ChatGPT to develop and ensure that learners have the required skills to become critical thinkers.

## Methods:

The methodological approach is centred on combining reflection and Grounded Theory (GT) approaches (e.g., Pieters and Dornig, 2011). Many scholars examining grounded theory broadly have suggested that even though common grounds are accepted, the approach and application can be done in multiple ways (e.g., Bulawa, 2014; Murphy, Klotz and Kreiner, 2017; Sosa-Díaz and Valverde-Berrocoso, 2022). Accepting the common ground that GT focuses on the systematic evaluation of results/ data, to then generate a theory or further elaborate on one (Murphy, Klotz and Kreiner, 2017), the methodological approach adopted in this article is the Constructivist Grounded Theory or CGT (Lindqvist and Forsberg, 2022). According to CGT the researcher does not put aside their knowledge in assessing data but remains with an open mind during their evaluation (Lindqvist and Forsberg, 2022). In this sense, a reflective account of evaluating both the given responses by ChatGPT (3.5) and the process of obtaining the responses is conducted through the usage of systematic questioning (prompts) and assessing the responses via the marking criteria of the case study assessment (Appendix 1).

The methodological approach starts by importing two case studies, which were used as an assessment for the Level 6 Hate Crime and Discrimination module, into ChatGPT (3.5), followed by the same instruction learners were given: *"Consider what sort of crimes and incidents X and Y were subjected to and whether they have any legal protection in the UK"*. At this point, it should be noted that the 3.5 version is used due to its free-to-use form which makes it accessible for every student (concerning mainly financial status), while also because the latest version (ChatGPT 4) during the period of this study paused users' upgrades (OpenAI Developer Forum, 2023). After evaluating the response given to this particular prompt, additional prompts were imported, as presented in Table 2.1, to facilitate a more systematic examination of its capabilities and limitations in resolving case studies. Lastly, through a comparative account of the responses and the marking criteria, the researcher aimed to provide a critical perspective on ChatGPT's capabilities. Even though the initial aim was concerned with ChatGPT's capabilities in providing critical responses, in the later stage of analysis through CGT and reflection the focus of the study centred on the process of producing and evaluating the creation/ outlining of knowledge.

Table 2.1: Prompts given to ChatGPT	
Prompt 1	"Can you solve a case study?"
Prompt 2	Case study followed by the assignment questions (Consider what sort of crimes and incidents X and Y were subjected to and whether they have any legal protection in the UK.")
Prompt 3	"Can you analyse more the hate crime and incidents?"
Prompt 4	"What legislation can be considered?"
Prompt 5	"Overall, can you critically assess the impact of the hate crime for X and Y?"
Prompt 6	"What characteristics of X and what of Y were targeted?"
Prompt 7	"Can you write an answer with all the above in an academic manner?"

**Table 2.1:** Prompts Given to ChatGPT

## Results:

## Marking the Generated Responses

## Capabilities

Starting with the evaluation of the responses provided by ChatGPT, for both cases, ChatGPT was able, even by the initial response (see responses in Appendix 2) to answer the original question by identifying what sort of hate crimes and events of discrimination the victims faced. While providing a fundamental structure in the response given, by explaining first the incidents and if they are considered a hate crime or discrimination, ChatGPT showed good analytical performance by providing definitions that can support the classification. It should also be mentioned that ChatGPT did not only answer regarding the types of crimes experienced by the victims but also provided a response regarding the police. Lastly, but importantly, regarding the legal aspect, ChatGPT was able to provide a very good response concerning the legal protection the victims have. Regarding this point and through the follow-up prompts, ChatGPT provided various legislation within the United Kingdom regarding the protected characteristics tailored to the characteristics targeted in each case. Overall, ChatGPT was able to adequately resolve the given case studies, while also providing

analytical perspectives that in matters of content, when examining the marking criteria, could be classified as "good".

## Limitations

While ChatGPT has shown to be able to provide good responses in content accompanied by analytical aspects, there are certain limitations and failures. Starting with the latter, ChatGPT failed to consider that the victims were a couple, thus certain actions listed under "Hate Crime" would have affected both. Additionally, a second failure, and critical in both criminological and legal aspects of the response, is the classification between hate crime and hate incident. An excellent response should have considered the threshold of classifying an action as a hate crime. In this case, a critical response would have separated the two while criticising the police's response and dismissal. Furthermore, concerning limitations, ChatGPT (3.5) can only provide short and succinct responses that may not fulfil the requirements of an essay. Additionally, regarding referencing, it was able to provide correct citations regarding legislation, but references were not provided regarding definitions. Due to this, the aspect of analysing and synthesising responses by utilising various sources would be classified as "satisfactory".

## Criticality

Critical thinking in criminology would be associated with the understanding and conceptualisation of socio-political issues, especially concerning inequality, social power dynamics and oppression when analysing matters of hate crime or discrimination. According to the responses given by ChatGPT to the given prompts, sociological and criminological explorations of such matters were merely mentioned, as the responses focused on individuals without identifying the broader harm towards the group. Critical thinkers would have been expected to approach such issues by recognising concepts of domination and status, which would be in alignment with relevant definitions - for example, Perry's (2001). While the police's response could have been classified as critical thinking, the examination was merely upon the dismissal without further analysis of the social impact and harm or broader sociological and criminological theoretical perspectives.

Through the examination of the results, it can be argued that ChatGPT (3.5) can provide adequate and "good", overall, responses in content, although having in mind that this is addressed for Level 6 learners, a critical analysis would have been expected, which places the responses between "reasonable" and "good". Moving beyond the mere outline and evaluation of the responses, and through the reflective account, the focus is on why ChatGPT was able to provide such answers and how tutors can assist learners in becoming critical thinkers when adequate answers can be generated by AI. In the discussion these two main aspects are examined, followed by recommendations for both AaL in developing critical thinkers and for future studies on AI within Education.

### Discussion and Recommendations:

### Discussion of the Capabilities and the Wider Limitations

To sum up, before further discussion, the findings indicate that ChatGPT effectively generated responses ranging from reasonable to good regarding the case studies derived from the 2022-2023 assessments of the Hate Crime and Discrimination module, an elective for Level 6 students. These responses demonstrate the expansive capabilities of AI, particularly ChatGPT (3.5), in analysing and, to a certain but inadequate for Level 6 degree, critically evaluating case studies. Furthermore, ChatGPT exhibited proficiency in synthesising legal arguments, underpinned by appropriate reasoning, drawing from relevant legislative acts. Overall, ChatGPT succeeded in delivering a comprehensive response that aligns with the specified marking criteria. It adeptly identified various aspects, ranging from the nature of the crimes or discrimination issues to the shortcomings or failures in police response, and the legal implications, including the targeted characteristics.

Besides the limitations discussed regarding content and especially concerning critical accounts in analysis, the discussion should target, as aforementioned in the Criticality subsection of the Results section, the limitation derived from the process of generating and accepting knowledge produced by ChatGPT. Two elements are identified through the researcher's reflection, which are "Authority" and "Knowledge". The first is concerned with the power of the person to ask the appropriate prompts to maximise the results, while the second element is concerned with both the *a priori* and *a posteriori* knowledge of the person on the subject which ChatGPT is asked. It should be noted that both elements can be perceived as distinct from each other, although it is more important to understand them as interconnecting issues; for example, asking the appropriate questions and providing the most effective prompts might require *a priori* knowledge in knowing what to ask and why, but also *a posteriori* knowledge in being reflective to ask a more targeting question if necessary. In this sense, the power of being able to resolve case studies excellently when using ChatGPT would be the subject of the questions/ prompts given.

According to this, further analysis of the case study, the characteristics, and the legal protection were not explored through the initial response given by ChatGPT, which required follow-up prompts. In this case, if a student were to use ChatGPT for resolving this case study, it would require them to be critical in knowing what they need to include in their essay/ response first, and then create additional prompts for ChatGPT. On the other end of the spectrum, knowledge is also a significant factor in the limitations. In this case, it is granted that the tutor/ researcher has an *a priori* knowledge of the ways the case studies can be resolved and the appropriate responses, which can assist in the evaluation of the ChatGPT and even follow the appropriate follow-up prompts should be able to evaluate the responses with additional independent research. Additionally, the student would be required to be reflective and critical of the responses given to further evaluate them,

especially if *a priori* knowledge is not adequate for the initial evaluation. In this case, the person using ChatGPT in resolving a case study would need to challenge the provided knowledge as untrue, and through further independent research to evaluate if the responses would be accepted or rejected.

## **Critical Pedagogy on Demand and Recommendations**

Mirroring upon the two elements of enhancing criticality when using ChatGPT and as outlined in the previous Criticality subsections, the second concept of examination centres around the first challenge set by ISSOTL concerning how can tutors assist in developing critical thinkers. In this case, the discussion aims into a combination of the literature explored and the two elements discussed, in order to provide a practical recommendation according to the AaL framework. Critical Pedagogy and ISSOTL have been concerned with the ways in which criticality can be enhanced. Of key importance in both instances is the "mind habit" of individuals being able to challenge given truths and through ethical and epistemological examination to accept or reject given truths or knowledge. In the same way, under the concept of AaL and Active Learning, learners should not be passive recipients of knowledge but rather active participants in the process in which knowledge is produced and evaluated.

In an academic context, the advent of Active Learning approaches, such as case studies, and Authentic Assessments in AaL play a pivotal role in fostering critical thinking. However, the burgeoning influence of AI, particularly ChatGPT, necessitates a shift in HE towards a more critically engaged pedagogy; due to a potential concern of learners utilising such a tool without yet having developed appropriate skills in assessing knowledge and given truths. Furthermore, such a threat becomes potentially more severe, when formative assessments for knowledge are based solidly on the passive acceptance of the recommendations given by tutors rather than the active enhancement by learning through the assessment. Thus, the call is for academia and education to embrace critical pedagogy by teaching students how they can evaluate and challenge given truths.

In a more practical approach, the recommendation is to adopt ChatGPT and AI in teaching, instead of demonising such tools. Following similar reflective approaches, learners could be potentially given a case study which instead of focusing on resolving it, they will be asked to import it into ChatGPT. The assessment will require students to critically reflect upon the prompts and responses given and write a report in which they explore the areas in which ChatGPT provided adequate and inadequate responses. In their critical evaluation learners will be expected to use both *a priori* knowledge learned through the sessions and *a posteriori* knowledge as they will be expected to act as independent researchers to justify their evaluation. Such technique not only would align with AaL and Active Learning practices but also would contribute to the development of critical thinkers as they will be actively reflective upon given truths. Potentially, such a practice would become a "mind habit" – having in mind both Socrates' questioning approach and Pierce's pragmatic theory of truth

(e.g., Chiasson, 2005; Oyler and Romanelli, 2022). Additionally, the aim of such practice would be that learners would develop a practical habit of critical thinking as outlined in Ennis' taxonomy regarding critical thinking (2011b) and as presented in Table 4.2 (especially mirroring upon points 1, 3, 5, 6, but not limited to them as all 12 points can be considered).

Table 4.2: Ennis' Taxonomy for Critical Thinking – A Critical Thinker:		
1. "Is open-minded and mindful of alternatives"		
2. "Desires to be, and is, well-informed"		
3. "Judges well the credibility of sources"		
4. "Identifies conclusions, reasons, and assumptions"		
5. "Asks appropriate clarifying questions"		
6. "Judges well the quality of an argument, including its reasons, assumptions, evidence, and		
their degree of support for the conclusion"		
7. "Can well develop and defend a reasonable position, doing justice to challenges"		
8. "Formulates plausible hypotheses"		
9. "Plans and conducts experiments well"		
10. "Defines terms in a way appropriate for the context"		
11. "Draws conclusions when warranted – but with caution"		
12. "Integrates all items in this list"		

(Source: Ennis, 2011b, pp.2)

Hence, following the example from Critical Pedagogic Practices in challenging given truths in the literature, the suggested learning approach aims not only to evaluate the learners' knowledge but to further develop critical thinking by actively teaching them how and why challenging given truths is important. Lastly, it should be stated that such assessment or practice of enhancing critical thinking skills may be applicable across academic fields. In this sense, case studies or scenarios, which are used in a variety of fields as means of active learning (e.g., Robinson, 2000; Cant and Cooper, 2009; Fisher, Esparza, and Olimpo, 2019), could be given to learners to assess given truths following the paradigm of Authority and Knowledge. However, it would be worth noting that such an approach would potentially require a reflective account of adaptation guided and influenced by the continuous evolution of AI.

On a developing note, it should be stated that such a practice may impose certain shortcomings which tutors should aim to avoid. The first shortcoming to be mentioned is to make sure that such an assessment would be in alignment with the Learning Outcomes set of the module guide, or for Hertfordshire University, the module's Definitive Module Document (2022). In this case, tutors may consider either using such practice as a learning activity or adding additional formative assessments. A second potential shortcoming concerns ChatGPT and AI and their commitment to inclusivity. As discussed ChatGPT has a free version (3.5) which should be accessible to all and can be outlined as a required field for the assessment to use this version. However further examination of reasonable adjustments is required to ensure that all students are in a capacity to access and use ChatGPT.

## **Conclusion and Future Studies**

In conclusion, the overall examination suggests that ChatGPT can be efficient in addressing case studies, particularly on issues of Hate Crime and Discrimination, showcasing its potential as a tool in education. Furthermore, the analysis and discussion suggest that it is imperative to integrate Active Learning and Critical Pedagogy within Higher Education (HE) curricula. Such integration is essential for cultivating and enhancing critical thinking skills among learners, especially in criminology curricula where criticality is a key skill for learners. While AI technologies can aid in the educational process, the enhancement of criticality requires a more interactive and reflexive educational approach. Therefore, combining AI tools with active learning, AaL strategies, and critical pedagogy is crucial for fostering a more comprehensive learning environment. As a concluding remark, while case studies and the ISSOTL challenge can be reflective of a broader practice within academia, this article suggests that criminology curricula, particularly in modules such as Hate Crime and Discrimination, can potentially benefit through the integration of AI and ChatGPT in learning practices, activities, and AaL by assisting in the development of critical thinkers.

In light of this examination, three primary recommendations are proposed for future research. Firstly, an in-depth investigation into diverse forms of AaL approaches across various academic disciplines, including students' perceptions or reflective accounts would be essential in evaluating both the strengths and limitations of ChatGPT in delivering accurate and subject-appropriate content. Secondly, it is crucial to systematically explore the pros and cons of integrating AI in academic settings, with a specific focus on employing tools like ChatGPT for the development of critical skills in an evaluative capacity. This exploration should aim to understand the implications of AI application in educational contexts, especially as a tool for learning/assessment. Lastly, a detailed analysis of ChatGPT (4.0) is recommended to discern the advancements compared to its predecessor (3.5 version). Such an analysis would provide valuable insights into whether the attest version has surpassed previous limitations and enhanced response quality.

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Marking Criteria:

Interpretation of Grade				Written Work Level 6 Grading Criteria				
Indicative Classificatio n Descriptor	Num eric Grad e (19 poin t scale )	Grad e Poin t	Grade Descrip tor	Presentation & structure 20%	Content / Knowledge 20%	Breadth / Depth & Integration of Sources 20%	Application, Analysis & Synthesis 20%	
	95		Outsta nding	Outstanding presentation & clarity. No significant grammatical / spelling errors. Work reads fluently with clear, appropriate structure.	Outstanding exploration of topic showing excellent knowledge & understanding. All relevant points have been identified and student may have shown awareness of the wider issues around victim typologies and lifestyle theory	Outstanding breadth & depth of sources used, showing student has read widely on the topic. Outstanding integration of appropriate authoritative sources into work – student has fully engaged with the sources in building an argument/case.	Outstanding level of Application, Analysis & Synthesis. Highly developed / focused work which has fully engaged with the question and has presented a convincing, well-supported argument. Outstanding level of link between the scenario and theories.	
	85	4.5	Excelle	Excellent structure. Fluent writing style with very few errors.	Excellent level of knowledge & demonstrated. Covers all relevant points & issues.	Excellent breadth & depth. Excellent integration of appropriate sources into work to help develop an argument.	Excellent level of Application, Analysis & Synthesis. Excellent level of link between the scenario and theories.	
1 <sup>st</sup> Class Honours	77	4.25	Very good		Very good clear structure. Articulate & fluent writing style. Very few grammatical errors &	Very good level of knowledge & understanding demonstrated. Key points are identified but some minor issues	Very good breadth & depth appropriate to topic, some evidence of wider reading. Sources integrated very	Very good level of Application, Analysis & Synthesis but not consistently taken to full extent.
	72	4.00		spelling mistakes.	may not be fully explored or applied	well to provide supporting evidence.	Very goof level of link between the scenario and theories.	
	68	3.75	-	Good clear presentation & structure with paragraphing.	Good level of knowledge & understanding demonstrated. Most major issues explored with some minor	Key sources are identified but limited evidence of wider reading.	Good level of Application, Analysis & Synthesis but some issues could be	

Upper 2 <sup>nd</sup> Class Honours	65	3.50	Good	Writing is mainly clear but some spelling &/ or grammatical errors.	aspects not considered	Sources may not be fully integrated into the work or may not always be the most authoritative sources.	addressed or developed further. Some minor omissions Style may be a little more descriptive and good level of link between the scenario and theories	
Lower 2 <sup>nd</sup> Class Honours	58	3.00	Clear Pass	Reasonable structure. Generally written clearly but there may be occasional grammatical & / or spelling errors.	Reasonable level of knowledge & understanding but with incomplete integration into topic set. A few major issues not fully explored and minor issues omitted.	Reasonable breadth & depth appropriate to topic. Some additional sources will be mentioned but too much reliance on key scholars that are covered in the lectures and seminars	Reasonable level of Application, Analysis & Synthesis but tends towards the descriptive and a few matters superficially addressed	
	55	2.75					or omitted Clear link between the scenario and theories but some omissions remain	
3 <sup>rd</sup> Class Honours	48	2.25	- Margin al Pass	Sa ba Cl gr Sp Margin	Satisfactory but a basic structure. Not always written clearly & has grammatical & / or spelling errors.	Basic level of knowledge & understanding but with limited	Basic breadth & depth appropriate to topic. Some sources will be mentioned but too much reliance key scholars that are covered in the lectures and seminars	Basic level of application, analysis & synthesis, with a number of matters superficially addressed or omitted. Not a clear link link between the scenario and theories
	45	2.00				integration into topic set. Some major issues not fully explored and minor		
	42	1.75			issues omitted.			
	38	1.00	- Margin al Fail	Weak format, limited or poor structure. Muddled work with many spelling & / or grammatical errors.	Unsatisfactory evidence of knowledge & understanding with	Limited or muddled understanding of the topic with limited reference to relevant	Limited evidence of analysis, application & synthesis.	
	35	0.75			limited exploration or omission of the major issues	sources with some irrelevant to topic.	More development & comment needed. Answer generally limited to accurate description.	
	32	0.50					Not a link between the scenario and theories.	
				Inadequate format & poor paragraphing / signposting.	Inadequate evidence of knowledge & understanding with very limited exploration or	Very limited understanding of topic with very limited reference to relevant sources and possible	Inadequate. Very limited evidence of analysis, application or synthesis.	

	25	0.25	Clear	Inappropriate writing	omission of the major	reference to irrelevant	Answer generally limited
			Fail	style	issues.	sources	to description, some of
							which is inaccurate.
				Poorly written &/or			
Not				poor spelling &			
applicable				grammar.			
			Little	Nothing of merit.	Nothing of merit.	Nothing of merit	Nothing of merit.
			or				
			Nothin	Poorly written work,	No evidence of	No breadth or depth to	No evidence of analysis,
			g of	lacking structure,	appropriate	answer nor reference to	application or synthesis.
			merit	paragraphing /	knowledge &	relevant sources.	Question has not been
				signposting.	understanding.		answered.
	10	0.00					
	10	0.00		spelling & grammar.			

## **Responses to certain Prompts:**

#### Responses to Prompt 2

Delia and Celin appear to be experiencing a range of discriminatory and potentially criminal incidents based on their sexual orientation and gender presentation. In the UK, there are laws and legal protections in place to address these issues. Here are some potential crimes and incidents that Delia and Celin may be going through and the legal protections they may have:

**Harassment and Discrimination:** The incident where a coworker sprayed women's perfume around Delia and made derogatory comments about her appearance could be considered harassment and discrimination based on her gender presentation. The Equality Act 2010 in the UK protects individuals from discrimination on the grounds of gender reassignment and sexual orientation.

**Hate Crime:** The act of painting their front door and windows with permanent rainbow colors could be considered a hate crime. A hate crime is any criminal offense that is perceived by the victim or any other person to be motivated by hostility or prejudice based on sexual orientation. The police should take hate crimes seriously and investigate them as such.

**Disability Discrimination:** The derogatory comments made about Celin and her wheelchair use in the workplace could be considered disability discrimination. The Equality Act 2010 also protects individuals from discrimination based on disability.

**Failure to Protect:** The line manager's decision to make Delia redundant due to her masculine appearance and the factory's failure to address the harassment can be seen as

a failure to protect employees from discrimination and harassment. Employers have a legal obligation to ensure a safe and inclusive working environment.

**Police Response:** The response of the police officer, who dismissed their complaints and made insensitive comments about their lifestyle choices, may itself be a violation of their rights. The police should take reports of hate crimes and discrimination seriously and investigate them thoroughly.

Delia and Celin have legal protections under the Equality Act 2010 in the UK, which prohibits discrimination based on various protected characteristics, including sexual orientation, gender reassignment, and disability. They may have grounds to file complaints with their employer and potentially take legal action if the discrimination continues. They should document all incidents, gather evidence, and seek legal advice to explore their options for addressing these issues. They may also consider contacting organizations and support groups that specialize in LGBTQ+ and disability rights for guidance and assistance in addressing their concerns.

Alan and Balan have experienced several incidents that may involve various legal issues in the UK:

**Discrimination at Work:** Alan faced discrimination at work when her manager suggested that her transsexual status could harm the hospital's reputation. In the UK, this may be considered workplace discrimination based on gender identity, which is protected under the Equality Act 2010.

**Workplace Promotion:** If Alan's request for promotion and training was denied solely due to her gender identity, it could also be a violation of the Equality Act, as it prohibits discrimination in employment decisions.

**Hate Crime:** Balan's experience of being bullied by teenagers, including offensive graffiti and physical assault, may be considered a hate crime. Such actions, targeting individuals based on their sexual orientation or nationality, can be prosecuted as hate crimes in the UK.

**Police Response:** The police's response to their report, suggesting they ignore the incidents or move, may be inadequate. Police are expected to take hate crimes seriously and investigate them thoroughly.

In the UK, there are legal protections against discrimination and hate crimes based on gender identity, sexual orientation, and nationality. Alan and Balan could consider seeking legal advice or reporting these incidents to organizations like Stonewall or local antidiscrimination authorities for support and guidance. Responses to prompt 4

In the UK, Delia and Celin have legal protections under several key pieces of legislation that are designed to protect individuals from discrimination, harassment, and other unfair treatment based on various characteristics, including sexual orientation, gender reassignment, and disability. Here are the primary pieces of legislation that can be used to protect them:

**Equality Act 2010:** The Equality Act 2010 is a comprehensive piece of legislation that provides protection against discrimination and harassment on various grounds, including:

**Sexual Orientation:** Delia and Celin are protected from discrimination and harassment based on their same-sex marriage and sexual orientation.

**Gender Reassignment:** Delia is protected against discrimination or harassment due to her gender presentation, and Celin is also protected as a person with a disability.

**Disability:** Celin is protected from discrimination based on her disability and the derogatory comments made about her wheelchair use.

**Equality Act 2010 - Harassment:** The Equality Act 2010 also explicitly addresses harassment related to the protected characteristics, making it illegal to harass individuals based on sexual orientation, gender reassignment, or disability.

**Hate Crimes:** Hate crimes, including those based on sexual orientation or disability, are covered under various UK laws. These include the Criminal Justice Act 2003 and the Crime and Disorder Act 1998, which enhance penalties for crimes motivated by hatred or prejudice.

**Employment Law:** Various employment laws and regulations, including the Employment Rights Act 1996, protect employees from unfair dismissal and provide mechanisms for addressing workplace discrimination and harassment.

**Police Conduct and Complaints:** If the police officer's response is deemed inappropriate, Delia and Celin can file complaints against the police officer's conduct. The Independent Office for Police Conduct (IOPC) oversees complaints against the police in the UK.

To protect their rights and seek remedies for the discriminatory incidents they have experienced, Delia and Celin should consider taking the following steps:

• Document all incidents, including dates, times, locations, individuals involved, and any witnesses.

- Report the incidents to their employer and follow the company's grievance procedures.
- Seek legal advice from a solicitor or an organization specializing in discrimination and employment law.
- Contact support organizations, such as Stonewall or organizations focused on disability rights, for guidance and assistance.
- If necessary, involve law enforcement to investigate and address hate crimes or harassment.
- It's important to be aware of their rights and use the available legal mechanisms to ensure that they are protected from discrimination and harassment based on their sexual orientation, gender presentation, and disability.

In the UK, several pieces of legislation can be used to protect individuals like Alan and Balan from the various incidents they've encountered, including workplace discrimination, hate crimes, and bullying. The legislation that can be applied to their situation includes:

**Equality Act 2010:** The Equality Act 2010 provides comprehensive protection against discrimination and harassment on various grounds, including gender identity, sexual orientation, and nationality. This act encompasses several aspects of their experience, particularly workplace discrimination based on gender identity and the hate crime based on perceived sexual orientation and nationality. It also addresses the duty of care that employers have for their employees' well-being.

**Criminal Justice Act 2003 (as amended):** This act allows for enhanced penalties for offenses that are aggravated by hostility based on protected characteristics, including sexual orientation and nationality. It can be invoked in the context of the hate crime experienced by Balan.

**Offences Against the Person Act 1861 (as amended):** This act covers offenses such as assault, which can be used to prosecute individuals who physically assaulted Balan, resulting in his broken finger.

Malicious Communications Act 1988 and Communications Act 2003: These acts can be utilized if the harassers engaged in making offensive or threatening communications, including the graffiti on Balan and Alan's door. Such communications can be considered malicious or harassing and may lead to legal consequences.

**Public Order Act 1986 (as amended):** This act contains provisions related to offenses involving disorderly conduct, violent behaviour, and harassment in public places. It can be used in cases of hate crimes and public harassment.

**Protection from Harassment Act 1997:** This act can be applied in cases of harassment, whether it occurs in the workplace or in the community. It provides remedies and protection against harassment and stalking.

These pieces of legislation are designed to protect individuals from discrimination, harassment, and hate crimes in the UK. Alan and Balan may consider seeking legal advice and support to navigate the legal process and ensure their rights are upheld. Reporting incidents to the appropriate authorities and organizations specializing in these issues is crucial to addressing their experiences effectively.

**Complaints Against Police Conduct:** Alan and Balan have the option to file formal complaints against the police conduct if they believe their reports were mishandled or not taken seriously. They can do this through the Independent Office for Police Conduct (IOPC) or the local police complaints authority, which can investigate their concerns and take appropriate action.

Use of AI-based research tools to promote development of reading comprehension skills and engagement with primary research literature in international postgraduate students

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#### Abstract

Independent reading and selection of appropriate sources of information is a core learning outcome for postgraduate students, enabling acquisition of advanced and in-depth knowledge within their field of study, which is a core pillar supporting research and professional skills. According to recent studies, students' reading comprehension has substantially declined in the past decade both globally and across educational systems. While the causes of this phenomenon are still not entirely defined, the impact on student's performance in higher education is tangible. This is particularly relevant for international students, who also face the challenges imposed by language barriers and cultural differences. The objective of this study is to understand, through a class survey and a literature review, whether AI-based research tools developed to help scientists in their work practice, can be used to support literacy development in the stage of advanced reading. In particular, the focus of this study is on international students, the reading skills of which are often weakened by the challenges they face navigating through a different education system. The study reinforces the idea that the ethical implementation of AI-based research tools in teaching practice can promote access to and fruition of advanced reading resources, such as primary research articles, which are essential for acquiring the breadth and depth of knowledge necessary to both achieve high university grades and ensure a career progression in the chosen profession.

#### Introduction

Since its first conceptualisation seventy-five years ago in Turing's report entitled "Intelligent Machinery" (Turing, 1948), Artificial Intelligence (AI) has become an integral part of our life and has significantly impacted the education sector. While the use of AI-based tools in Higher Education (HE) is frequently regarded with scepticism and fear due to ethical concerns around knowledge ownership, information biases and the potential to widen the digital divide and socio-economic inequalities among students, there is growing urgency to change teaching practices to integrate, challenge and redirect AI to promote learning (McMinn, 2023).

In an era of internationalisation and globalisation of HE, one of the main promises of AI is its potential to improve the experience of international students by providing personalised and adaptive learning opportunities, as suggested by Wang et al, 2023. The striking capability of AI to sustain powerful adaptive learning through both recognition of uncommon learning patterns and generation of customised content which would be beyond reasonable human

capacity was also highlighted in a recent report by the United States Department of Education, Office of Educational Technology (2023).

According to the Global Student Survey 2023 (Chegg.org, 2023), conducted by Chegg.org to gain insight into how undergraduate students perceive the use of generative AI and its impact on HE, 65% of students worldwide would desire to receive training in AI tools relevant to their future career. Interestingly, demand was particularly high in Asian, African, and South American countries, while students from Australia, US and UK were the least interested in receiving such training. Given that the latter also are the most popular destinations for international students (UIS, 2023), accounting for 34% of inbound internationally mobile students in 2021 (40% including Canada), identifying strategies to support international students through implementation of AI tools in HE appears to be a priority especially for Anglosphere countries. Indeed, the number of international students enrolled in UK universities at the postgraduate level has dramatically soared in recent years, with a jump of around 80% between 2017/18 and 2021/22 (Erudera, 2023). Together with the rapidly evolving landscape of digital technology, the globalisation of learning offers the UK HE sectors important avenues for reshaping teaching practices. While the applications of Al-based tools to support students' learning are still a matter of debate, their capacity to reform the educational experience of international students should be explored.

## Background

The past forty years have witnessed the sudden rise in digital technology and the spark of a never ended digital revolution. During the last decade of the past Century, the invention of the World Wide Web, the surge in digitisation of information and the popularisation of personal computers and mobile phones opened the way to a relentless acceleration in the digitalisation of human life (Hilbert and López, 2011), which contributed to dramatically reshaping the way students learn. As first proposed by Carr (2008) and then corroborated by numerous studies (as reviewed by Guo, 2023), digitalisation has led to a drastic change in reading habits and critical thinking skills (Greenfield, 2009; Wolf, 2018), which has resulted in a global decline in students' ability to comprehend and interpret longer, complex texts (Twenge et al., 2022; OECD/UNICEF, 2022).

This is also reflected in the numerous concerns that college and university educators have raised over the past twenty years regarding a decline in student engagement with and reading comprehension of academic texts. Indeed, over 70% of students from various disciplines admit to not completing the assigned course readings and reported a disengagement from independent study (Berry et al., 2011; Hobson, 2004; Deale & Lee, 2021). One of the main reasons behind this figure can be found in deficits in language use and understanding (Kerr and Frese, 2017), the extent of which can be even bigger in international students at the start of their study abroad journey.

In the context of university level science courses, a second layer of complexity comes from the requirement imposed by many universities to engage with primary research literature starting from the first year of study. This is particularly relevant for postgraduate students, who are expected to be proficient users of primary research articles and to independently engage with them throughout their courses. The ability to select, read and interpret primary research articles is a fundamental skill for all scientists, and is recognised as a central foundational and applied knowledge that UK science postgraduate students should acquire at the end of their Master of Science programmes. The Quality Assurance Agency for UK degrees states that students graduating with a Master's degree in Biosciences should be able to "interrogate and integrate diverse sources of scientific literature alongside other information sources, in order to design and develop methods for investigation and analysis, including in areas at the forefront of knowledge and outside their current specialist knowledge" (QAA, 2023:22).

Universities and learned societies have developed numerous resources to help inexperienced readers approach primary research articles, from step-by-step guides (University of Utah, 2013; American Society of Plant Biologists, 2013; Glasgow Caledonian University, 2020), to focused assignments (Spiegelberg, 2013) and tutorials (Willmott et al., 2003). These approaches are mainly dedicated to undergraduate students and were reported as being successful in improving scientific literacy, engagement with scientific research and transition to postgraduate study (Hoskins et al., 2007; Hoskins et al., 2011; Kozeracki et al., 2006). Postgraduate students are normally expected to have already been exposed to these approaches and possess the required reading comprehension skills. Nevertheless, coming from different cultural and academic backgrounds and having different linguistic abilities, many postgraduate students struggle to cope with researchoriented assignments (such as seminars and data interpretation tests), literature reviews and project reports, and this may affect their academic performance and employability. Therefore, the diverse skills of international postgraduate students should be considered when designing the curriculum.

In this regard, one of the main problems highlighted at both undergraduate and postgraduate level on scientific degree programmes is the limited and incorrect use of the primary scientific literature, often due to weak reading skills.

Identifying strategies to promote reading comprehension is therefore pivotal to both ameliorate students' experiences and facilitate their future career development. This is particularly true for international students, the learning experience of which can be undermined by the numerous sociocultural, academic, psychological and financial challenges they have to face while adapting to live and study in a foreign country (as reviewed by Oduwaye et al., 2023).

## Purpose

In recent years, various software harnessing AI technology have been developed to help researchers read, write, and manage primary scientific literature. Among them, Avidnote and Kahubi are spreading fast across scientific research communities. These tools can aid researchers in tasks such as managing literature databases, identifying research gaps and suggesting study design. Both software are available with free and paid subscription plans. The free versions are sufficient to assist with reading and analysing research articles. Among their various functions supporting reading comprehension of primary research articles, these tools can simplify the language, summarise the key findings and highlight related studies.

The scope of this work is to investigate, through a class survey and a literature review, the potential use of AI-based research tools, such as Avidnote and Kahubi, to promote reading comprehension of primary research literature in international postgraduate students in Biosciences Master's degrees.

This study was guided by the following research questions:

- How much do international postgraduate students engage with primary research articles?
- What is their perception of their own reading comprehension skills?
- Do AI-based research tools hold the promise of being able to support international postgraduate students in acquiring advanced reading comprehension skills?

## Materials and Methods

For this study, a literature review was conducted to investigate the potential use of AI-based research tools to support international postgraduate students acquiring advanced reading and comprehension skills. Materials, including scholarly and research articles, reports from HE institutions and agencies, and online learning resources, were selected based on their relevance to the research questions, considering their publication date (when possible, literature no older than ten years ago was selected) and the authority of the journal.

The AI-based research tools in this article were chosen based on their popularity in the field of science, and not for promotional purposes.

The study comprises a class survey integrating both quantitative and qualitative questions. The survey was conducted online through a Mentimeter presentation to ensure students' anonymity. Answers were not revealed to students. The sample included international postgraduate students enrolled in two different Biosciences Master's degree programmes (Medical Microbiology and Molecular Biotechnology) at the University of Hertfordshire and attending the first Semester of the Academic Year 2023/24. Students were surveyed after an assignment involving the oral presentation and critical discussion of a primary research article to gain insight into their perception of their own reading comprehension skills and their interest in the use of AI for learning. Qualitative and quantitative items were related to the following: what types of resources students use to study, how often students read primary research literature, what sections of the presented research articles students found easier to approach or struggled more with, how often students use AI, what opinion students have about the use of AI to help them read primary research articles. The quantitative items provided numeric data, while the qualitative items allowed a better comprehension of students' thoughts related to the study's objectives.

#### Results

To investigate the potential use of AI-based research tools to support reading and comprehension of long-form content, such as primary research articles, in international postgraduate students, a class survey and a brief literature review were run in parallel.

## International postgraduate students' thoughts on their reading comprehension skills and the use of AI-based research tools

To understand international students' perception of their own reading comprehension skills and their interest in receiving training on AI-based research tools to improve their study skills, a class survey was run at the University of Hertfordshire among international students enrolled on Biosciences master's degrees. For this study, 31 complete surveys were collected. The sample consisted of predominantly female students (77.4%). Most of the surveyed students were 25 years old or older at the time of the survey (25-34 years old: 51.6%; 35-44 years old: 9.7%). The students belonged to three main geographical groups: South Asia (71,0%), Southwest Asia (6.4%) and West Africa (22.6%). No reading or other learning disabilities were disclosed (Table 1). **Table 1.** Description of the sample.

Gender					
Male	7	22.6%			
Female	24	77.4%			
Age					
18-24	12	38.7%			
25-34	16	51.6%			
35-44	3	9.7%			
Geographical region of origin					
South Asia	22	71.0%			
Southwest Asia	2	6.4%			
West Africa	8	22.6%			
Reading or other learning disabilities					
Yes	0	0.0%			
No	31	100%			

The first set of questions revolved around the reading habits of the surveyed students (Table 2). When asked to list the three main sources of information used to study, students named lecture slides as their first choice (71.0%), followed by Youtube videos in second position (61.3%) and academic books in third position (58.0%). Quite strikingly, primary research articles were included among their main choices by less than half of the surveyed students (45.2%), while Youtube was preferred over academic books. This result is in line with the observed shift towards sources of information not involving long-form content and including a vast selection of visual aids (Genota, 2018; Ralph, 2021). Furthermore, nearly one third of students declared to read five or less research papers per month (up to two articles per month: 32.3%; up to five articles per month: 41.9%), with a remaining 19.4% fully avoiding such literature.

Three main sources of information used to study					
Academic books	18	58.0%			
Corporate websites	11	35.5%			
Lecture slides	22	71.0%			
Primary research literature	14	45.2%			
Wikipedia	9	29.0%			
Youtube	19	61.3%			
Number of primary research articles read per month					
0	6	19.4%			
1-2	10	32.3%			
3-5	13	41.9%			
5-10	1	3.2%			
More than 10	1	3.2%			

**Table 2**. Role of primary research literature as study resources.

In the second set of questions, students were asked to reflect on their reading comprehension skills with reference to the scientific article that they discussed during a previous oral seminar presentation assignment (Table 3). Interestingly, despite only a few students being able to fully grasp their assigned paper and pertinently contextualise, describe and discuss the presented results, nearly half of the surveyed individuals indicated the complexity of the text to belong in the lower range (1-4) on a scale of 1 to 10 (1-2: 9.7%; 3-4: 38.7%), with a further 29.0% allocating it in the middle range (5-6). Only less than a quarter students perceived the assigned article as difficult (7-8: 16.1%; 9-10: 6.5%). This result might be reconducted to the Dunning-Kruger effect, which is a cognitive bias whereby people tend to overestimate their knowledge or skills in a specific area, including information literacy (Mahmood, 2016). The most descriptive sections, such as abstract and introduction, were indicated as the most approachable parts of the assigned paper, while methods and results, requiring more advanced, deep reading skills, were designated as the most difficult ones (methods: 32.3%; results: 45.2%).

Overall, these results seem to suggest that most of the surveyed postgraduate students are inexperienced readers, who predominantly use written narratives to inform their understanding, rather than reading in a data-centric way as more experienced readers (Hubbard et al, 2022). Indeed, less than a quarter of the assessed students correctly identified the key results, drew relevant conclusions, and made correct use of the available literature to critically appraise the presented article (7 students out of 31).

Perceived complexity (reading and understanding) of articles chosen for the seminar presentation assignment 1 to 10)	of the (on a so	research cale from
1-2	3	9.7%
3-4	12	38.7%
5-6	9	29.0%
7-8	5	16.1%
9-10	2	6.5%
Most complex section (reading and understanding) research article	of the	assigned
Abstract	0	0.0%
Introduction	1	3.2%
Methods	10	32.3%
Results	14	45.2%
Conclusions	6	19.3%
Least complex section (reading and understanding) research article	of the	assigned
Abstract	8	25.8%
Introduction	18	58.1%
Methods	5	16.1%
Results	0	0.0%
Conclusions	0	0.0%

**Table 3.** Reading and comprehension of primary research articles.

Finally, students were asked to answer a set of questions to understand how frequently they use AI to study and their thoughts around the use of AI-based research tools to help them read and analyse scientific articles (Table 4). Differently from other surveys and studies reporting that more than 40% of the students make regular use of AI-based software worldwide (Chegg.org, 2023: 40%; Coffey, 2023: 49%; Nam, 2023: 56%; Reszczyński, 2023: 68%), with up to 70% of postgraduate students (von Garrel and Mayer, 2023), the majority of the surveyed individuals declared to either have used them rarely (35.5%) or to have never used them (42.0%). 6.4% of the students said that they use AI to help them understand taught topics or revise before assignments, and only 16.1% of them admitted using AI also to complete assignments. Although these results contradict previous observations, the presence of a lecturer while students were being surveyed might have affected the veracity of the answers, as students might have distrusted the anonymity of the survey and failed to disclose the real use of AI tools.

Use of AI-based software (generative and non-generative	e)				
Never used any	13	42.0%			
Rarely	11	35.5%			
Only when revising for assignments	1	3.2%			
Regularly, to better understand the studied topics	1	3.2%			
Always, to study, revise, and complete assignments	5	16.1%			
Possible use of an AI-based research tool to simplify the chosen research article (if knew it existed)	langua	ge of the			
Yes	9	29.0%			
Νο	7	22.6%			
Maybe	15	48.4%			
Don't know	0	0.0%			
Possible use of an AI-based research tool to highlight th the chosen research article (if knew it existed)	e key fii	ndings of			
Yes	22	71.0%			
No	7	22.6%			
Maybe	2	6.4%			
Don't know	0	0.0%			
Consideration of the use of an AI-based research tool as beneficial to help read and understand primary research literature					
Yes	19	61.3%			
No	0	0.0%			
Maybe	7	22.6%			
Don't know	5	16.1%			
Main functionality asked to an AI-based software in case of help with understanding					
Identify key findings	13	41.9%			
Identify related research studies	6	19.4%			
Identify study gaps	7	22.6%			
Simplify the language	5	16.1%			

**Table 4.** Thoughts on the use of AI-based tools.

Nevertheless, it is worth noting that 71% of students said that, if they knew it existed, they would have used an AI-based software to help them highlight the key findings of their assigned research article. Interestingly, only 29.0% of students said they would have used the same software to simplify the language, although another 48.4% were undecided.

Overall, 61.3% of students perceived AI-based research tools as beneficial to improve reading and comprehension of primary research literature, with a remining 38.7% of undecided students. The main tasks they said they would like to receive help with are

identification of key findings (41.9%), study gaps (22.6%) and related studies (19.4%). Simplification of language was indicated by only 16.1% of the surveyed students.

# Can AI promote acquisition of reading skills and comprehension of primary research literature?

Nowadays, the debate on the use of AI-based digital technologies in the classroom is extremely lively. While various forms of digital learning technologies already represent established components of students' learning experience, research is still going on to identify novel areas for improvement and development. In this regard, a report written for Nesta by the University College London's Faculty of Education and Society, 'Decoding Learning', highlighted the need to expand the range of available digital learning technologies, and how the potential of digital education can be fully realised only through innovative teaching practice that focuses on the learning activities that each piece of technology can support (Nesta, 2012; UCL, 2018).

Considering the research questions under exam in this study, the identification of new teaching strategies implementing AI-based research tools (e.g., Avidnote and Kahubi) can represent an effective strategy to promote the acquisition of advanced literacy skills in international students at postgraduate level.

Being directed to a specialized audience, the challenges imposed by primary research articles lie in their lexical sophistication, density of information, lack of simplified visual aids and unfamiliar terms and techniques, to which students are not normally exposed unless they have received previous professional training through a work placement in research or industrial settings. This can be further exacerbated by language barriers and different socioeconomic status and education backgrounds. Indeed, reading comprehension skills in language-minority students rarely reach the same levels as monolingual English speakers (August et al., 2009). Furthermore, according to a report from the Organisation for Economic Co-operation and Development (OECD/UNICEF, 2021), students' average reading performance is directly correlated with the gross domestic product (GDP) per capita of their country.

Many studies highlighted a global decline in reading skills among pupils and undergraduate students. In the latter case, the lack of an adequate preparation to meet the challenges of independent reading has been reported globally over the past ten years. Studies conducted on undergraduate students in African, European, South American and North American universities and colleges reported an inadequate preparation for university reading (Bharuthram, 2012; Livingston et al., 2015; Ntereke and Ramoroka, 2017; Baron and Mangen, 2021; Yáñez Botello, 2013; Johnson, 2019). In particular, students seem to have suboptimal comprehension on the inferential, critical, and organizational levels (de-la-Peña & Luque-Rojas, 2021). Baron and Mangen (2021) reported a constant decline in long-form reading among students, and highlighted the critical role played by long long-form texts

(e.g., novels and non-fiction books) in building and maintaining the cognitive strengths of students. Among the various factors which might affect long-form reading, including the rising cost of books and the amount of extracurricular activities, the authors highlighted the high impact imposed by digital technologies. As previously mentioned, digital media promote information overload, shorten the attention span of reader, and foster engagement with multi-tasking, superficial reading (Shreim, 2023). These observations align with the difficulties that a significant proportion of our postgraduate students encounter while completing tasks involving the use of primary research articles, such as writing literature reviews or laboratory and project reports.

Since two of the functionalities of AI-based tools like Avidnote and Kahubi that were included among the ones that surveyed students would like to use (Table 4) are simplification of the language and identification of the key findings of the study, their capacity to support students in reading and comprehending research articles have been analysed.

With the advent of AI and automated text simplification (ATS) software, various studies have focused on investigating the effectiveness of text simplification in educational settings. Text simplification has been traditionally used to improve the accessibility of non-fiction informational texts to non-expert, foreign and struggling readers. Indeed, informational texts, including primary research articles, comprise a discipline-specific vocabulary made of less frequent and more abstract words than the ones used in narrative texts (McNamara et al., 2012:93). In the context of international students, it has been estimated that, to achieve optimal text comprehension, readers need to be familiar with at least 98% of the words, while readability is significantly impacted in the presence of even as little as 10% unknown words (Hsueh-chao & Nation, 2000; Schmitt et al. 2011). In support of this, a study conducted on Saudi English as a Foreign Language (EFL) learners showed a correlation between reading comprehension and vocabulary knowledge, whereby possessing both large size and deep knowledge of English vocabulary facilitates reading comprehension of English texts (Al Qunayeer, 2021). Furthermore, science texts are also characterized by low sentence level, referential and verb cohesion, which contribute to increase text difficulty even further (McNamara et al., 2012:111).

Although research on the impact of ATS on reading skills is still limited, various studies reported positive effects on different types of learners. Work conducted on Korean English as a second language (ESL) learners showed that ATS software can be highly useful in improving text comprehension and knowledge recall in students with a higher reading proficiency as compared to the less proficient readers (Murphy Odo, 2022). Interestingly, these results contradict previous data showing that text simplification has a positive impact on learners with lower language abilities and background knowledge, while can have detrimental effects on high knowledge readers, who benefit instead from authentic, low cohesion texts (Crossley et al., 2014). Similar results were obtained when the effects of text

simplifications on reading comprehension were tested on native speaking children attending primary school. Even in this case, although more basic reading skills were tested, text simplification proved to be more beneficial for children with poor reading skills compared to more proficient readers (Javourey-Devret et al., 2022). Furthermore, the same study highlighted that text simplification yielded better results for literary than for scientific texts, possibly due to the involvement of more technical, low-frequency and hard to simplify vocabulary.

Overall, these findings indicate that the improvement in reading skills following text simplification varies according to students' qualification level, language proficiency and degree subject area, suggesting that the use of text simplification tools in science learning should be carefully considered. Therefore, it is worth reflecting on another aspect of learning that might be enabled by text simplification. A study conducted on a large group of English Language Learners of Spanish and Cantonese nationalities suggested that reading comprehension in not just linked to the breadth of English vocabulary, but also to the oral narrative skills (Uchikoshi et al., 2016). This notion supports the idea that AI-based research tools such as Avidnote and Kahubi, by simplifying the language and lowering the cohesiveness of advanced texts, might indirectly promote reading comprehension skills in international students through strengthening of their narrative skills. The use of these AIbased tools in preparation for oral reports and seminar presentations, which are types of authentic assessment highly used in postgraduate courses, can ameliorate oral narration by enhancing readability of primary research articles, thereby aiding the development of reading comprehension skills. While simplification of advanced reading resources might not broaden breadth and depth of students' vocabulary knowledge, particularly of those with higher language proficiency, by advancing student engagement with reading and their conceptual understanding through texts it can contribute to at least partially overcome the disadvantage imposed to international students by their lower English language and literacy skills (Trenkic and Warmington, 2018).

Beside language simplification, other functions that AI-based research tools can execute are text summarization, recognition of key research findings and identification of related studies, which are all tasks involving advanced reading skills and critical thinking. One of the main problems found in the surveyed international students is a lack of properly developed critical thinking skills, as evidenced by the low ability to discern relevant from irrelevant information and draw meaningful conclusions. This observation is supported by studies highlighting how the cultural values, educational approaches and teaching pedagogies adopted in developing countries from East and South Asia, where debate and argumentation are not fully accepted in the academic discourse, have contributed to hamper critical thinking in their postgraduate students (Durkin, 2008; Nauman, 2017). As proposed by Lam (2022), identifying the key message of an academic paper, drafting a summary of its content, and appraising it through comparison with other relevant readings are fundamental steps in the development of effective academic reading, and should be

encouraged in the classroom to promote engagement with advanced texts and research articles.

By using the aforementioned AI-enabled functions, students can be provided with practical examples of how to decode research articles and extract, organise and analyse the information contained therein. According to various studies, examples and practice problems are fundamental at the start of the learning process for the successful acquisition of problem- solving skills (as reviewed by Renkl, 2014), ultimately improving students' motivation and independent learning (van Harsel, 2019; van Harsel, 2022). In this context, AI-based research software may represent a useful tool accompanying direct guidance from the teacher to train international postgraduate students to become competent readers of primary research articles. Supporting this point, the potential use of AI tools in the classroom as a means of enhancing student learning "to complement and not substitute for [...] guidance from teaching staff" has recently been given a green light from the University of East Anglia (Yeoman et al., 2023).

#### Conclusions

In this article, the possible use of AI-based research tools like Avidnote and Kahubi to support reading comprehension skills in international postgraduate students was analysed. The study reinforces the idea that the ethical implementation of AI-based research tools in teaching practice can promote access to and fruition of advanced reading resources, such as primary research articles, which are essential for acquiring the breadth and depth of knowledge necessary to both achieve high university grades and ensure a career progression in the chosen profession. While this study does not fully define the entire potential of such tools, it confirms that some of their functions can be harnessed to increase postgraduate students' engagement with primary research articles and promote their reading skills through practice. Based on the literature analysed, language simplification can enhance reading comprehension by promoting access to information and preparation of oral assignments, through which text comprehension is enhanced. Furthermore, text summarisation and identification of key findings can provide examples of how to approach research articles and suggest strategies to successfully complete the reading task and reach effective text comprehension.

A class survey was conducted on international students enrolled in Biosciences Master's degrees at the University of Hertfordshire to understand how international postgraduate students engage with primary research articles and their perception on the use of AI-based tools to help them approach advanced scientific literature. The survey revealed that the majority of the students do not frequently use primary research literature in the field for studying and prefer instead resources containing short-form text and visual aids. Furthermore, although most students declared not to make regular use of AI-based tools, they expressed their interest in receiving training to use software that can help them simplify the language and identify the main information. This is in accordance with data

obtained from a global survey conducted by the education technology company Chegg (Chegg.org, 2023). Therefore, beside their potential applications on learning activities, the use of AI in higher education can represent an important value for the career development of students.

It has to be considered that the study was limited to two Master's degree programmes at a single university, and only 77.5% of the international students enrolled on those courses responded to the survey (31 out of 40). Furthermore, the majority of the respondents to the survey were female students (77.4%), and a striking disproportion between the number of students of South Asian origin (71%; mainly Indian and Pakistani nationalities) and those belonging to other ethnicities was alto recorded (22.6 of African origin and 6.2 of other Asian origin). Due to the small sample size, specific postgraduate subject area and unequal coverage of gender and ethnic groups among the surveyed students, the aforementioned results of the survey used in this study may not fully apply to a more diverse student population.

Based on the evidence provided, we can conclude that, if supported by training and supervision and flanked by face-to-face learning activities, the integration of AI-based research tools into the teaching practice may be beneficial for international postgraduate students. Nevertheless, the real efficacy of these tools cannot be assumed, and further research involving the actual use of those tools in the class is required to understand their full potential and the ethical implications of their use. Indeed, it is only through a careful analysis of the evolving contexts and learning themes of our society that these tools can be used in an ethical way that serves the purpose of supporting the learning process, rather than providing unsupervised learners with ways to bypass the acquisition of essential learning skills.

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## Harmony in Collaboration: Insights into Group Work Dynamics in HE

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#### Abstract

Though employed as a powerful strategy for learning, group work has become a key challenge In Higher Education (HE) in terms of students' engagement. Hence, this study aimed at exploring challenges associated with group work and strategies to overcome them from the perspectives of staff and students of the Hertfordshire Business School (HBS) at the University of Hertfordshire (UH) to better facilitate students to engage in group work. Current literature was referred to understand the existing scenario. Primary data were collected employing a questionnaire and focus groups from 34 students and interviewing ten staff members. Mixed method approach was used to analyse the data. Results revealed major challenges associated with group work and potential strategies to overcome them while discussing practically viable pedagogical concerns. Thus, current findings support developing insights into effective group work creating engaging teaching and learning environment for students to flourish their academic journeys in the UK HEIs.

#### Introduction

In the dynamic landscape of HE, group work, a cornerstone of collaborative pedagogy, serves as a powerful strategy for fostering creativity, critical thinking, interpersonal skills, and shared knowledge acquisition among students (Burke, 2011). Research highlights over 50 benefits of employing such collaborative learning (Laal and Ghodsi, 2012). The effectiveness of group work relies not only on its theoretical underpinnings but also on the lived experiences and perspectives of those actively engaged in the process. As to Burke (2011) and Higher Education Academy (2014) students' negative concerns on group work: free-rider issue, conflicting feelings appears to impede their academic performances and achievements.

Students' less engagement in group tasks, and the emphasis on this by academic colleagues motivated the researcher to conduct this study. There is limited research on exploring this aspect in the HBS at UH. There is a little discussion on the role of group work in internationalised UH context, and its role on enhancing students' achievements and socio-emotional skills. Therefore, the researcher prompted to investigate this aspect to facilitate students with effective group work strategies to improve their academic/social experiences. This research represents a pioneering effort as the first of its kind to delving into the group work dynamics within the chosen setting. The constructive collaboration between students' and staff's perspectives provides a comprehensive understanding of the group work challenges. Exploring the potential strategies to overcome them through the staff and students' perspectives and pedagogy would contribute towards effective students' collaborative learning endeavours at HBS.

This research also aims towards contributing to the University's mission to transform communities and society through research and innovation: developing graduate attributes (University of Hertfordshire, 2023a) and Herts Learning Principles (University of Hertfordshire, 2023b).

Hence, the current study explores students' and staff's perspectives on group work dynamics in HE while bridging the gap between theory and practice, and ultimately contributing to the ongoing dialogue on optimizing collaborative learning experiences for students. Through a synthesis of student and staff perspectives, this research endeavours to illuminate the path towards a more harmonious and effective group work environment, fostering knowledge dissemination, pro-social behaviours, and shared academic growth.

To move forward, research questions are stated below. After that, the relevant literature on the area is reviewed and the methodology is outlined. Research findings are presented and discussed. Finally, the conclusions and recommendations are presented introducing next stage of the study.

## **Research Questions**

- 1. What challenges do students encounter associated with group work?
- 2. How do staff members perceive the challenges encountered by students associated with group work?
- 3. In what ways can the students be supported to overcome the challenges associated with group work?

#### Literature Review

This section focuses on exploring related literature while critically evaluating the current findings on challenges associated with group work encountered by the HE students and looking for potential strategies to overcome the current challenges.

## **Group Work**

Working as a group is distinguished by all members being engaged in and contributing to a shared task to generate a collaborative outcome (Galton M. and Williamson J., 1992; Hammar Chiriac E., 2010). Conversely, not all groups work with shared partnerships as a group; instead, individuals work in a group, which, is common in academic environment (Granström, 2006).

According to constructionism, knowledge building is a social process which happens through connections and collaboration with others (Vygotsky, 1978). Hence, learner is inspired to act an imperative role in knowledge construction (Adams, 2006; Mondahl and Razmerita, 2014).

Thus, working as groups is more of a societal process for creating new knowledge advancing cognitive skills than an individual attempt.

## The Benefits of Group Work

Research demonstrates the advantages of placing students in groups to work for learning including significant higher achievement and retention compared to competitive and individualistic learning (Cohen, 1994; Johnson and Johnson, 1996, 1999). van Boxtel et al. (2000) highlight the contribution of peer interaction to identify gaps in knowledge, stimulates knowledge elaboration and thus enhancing individual cognitive gains. Group work also facilitates towards enhancement of communication, coordination, decision making, dispute resolution, and negotiation (Lai, 2011). Further, research shows positive impacts of online group activities in improving students' performance in problem-solving (Tseng, Sun and Wang, 2009).

Dillenbourg (1999) and Johnson and Johnson (1999) provide an overview of collaborative learning theories and strategies while shedding light on the potential benefits and challenges associated with group work in educational settings. Challenges encountered by students during group work (van Boxtel, van der Linden and Kanselaar, 2000) are explained next.

## **Challenges Associated with Group Work**

Research identifies technical challenges faced by students in online group work environments including issues such as connectivity problems, platform accessibility, and proficiency with collaborative tools which impede the smooth functioning of virtual groups (Kanuka and Jugdev, 2006).

For in-person group work, logistical issues: coordinating schedules and finding suitable meeting times were highlighted as significant challenges which can lead to frustration affecting overall efficiency of the group (Johnson and Johnson, 2009). Allen, Kannangara and Carson (2023) illustrates a significant, negative impact caused by the pandemic on UK university students including high level of psychological distress and anxiety and their lower level of flourishing in collaborative tasks. Even though they suggest applying a theoretical model of happiness (PERMA) proposed by (Seligman, 2018) notably it is unclear how to create positive emotions, engagement, relationships, meaning and achievement to overcome the encountered challenges by the students.

When unfamiliar contexts are used to illustrate the points, students find it greatly challenging to understand and perform their productive skills. Study suggests that the tensions between the groups in HE result from social and economic rivalry (Nsangou and Dundes, 2018).

The influence of social dynamics is identified as another recurrent challenge. Researchers highlighting the challenges: communication, individual contributions, and assessment fairness (Johnson and Johnson, 2009).

As facilitators of group work, staff recognize challenges faced by students: technical issues, coordination difficulties, and social dynamics (Taylor and Gillies, 2018). Having too many students in groups negatively affects group learning and academic performance (Xia Zhao *et al.*, 2020; Goh *et al.*, 2021). It is evident that current HE does not incline to particularly promote group solidarity but competitive individualism (Johnson, Johnson and Smith, 1998; Marturano, Wood and Gosling, 2010) and this does not facilitate the collective critical thinking process or improve collective group communication and intellect (Duhigg, 2016).

## **Theoretical Framework**

This study is informed through Felten's (2013) Scholarship of Teaching and Learning (SoTL) in partnership with students considering its appropriacy in practice within HE (Hubball and Clarke, 2010). By employing a questionnaire, focus groups and interviews focusing on inquiry into good student learning, considering the context of group work, exploring both students and staff perspectives using mixed method, designing & piloting the questionnaire in partnership with students and investigating literature and primary data to answer the research questions, the study aligns with good practices in SoTL.

The social constructivist viewpoint: knowledge is a product of social interaction with others, their cultural context, and the broader society (Vygotsky, 1978) and Compassion focused Pedagogy (CfP) (Gilbert, 2017) based on Compassionate Mind Foundation's psychobiological model of compassion are also considered in current research.

#### Research Design - Methodology

#### Sample

A sample<sup>1</sup> of 34 students and 10 academic staff members from HBS were selected employing convenience sampling<sup>2</sup> with maximum variation<sup>3</sup>.

<sup>1</sup>This study did not require ethics approval as this study conducted to improve teaching and learning (University of Hertfordshire, 2018) process of the academic programmes at HBS and the participants were not identified from their demographic information are any other way as all data were anonymise using pseudonyms and unique codes.

<sup>2</sup> As McCombes (2019) suggests, convenience sampling is often appropriate for research where the aim is not to assess a hypothesis about a population but to enhance a preliminary understanding of a population which is under-researched or small.

<sup>3</sup> For this study maximum variation sampling was also employed to ensure a balanced representation (i.e., as proportionate as possible) of genders, nationalities and multiculturality.

## **Data Collection**

First, conducting a literature review was prominent to identify any knowledge gaps or/and identify the any areas which need further exploration in relation to this research. Then, a questionnaire was designed in partnership with students and distributed among participants through an online link/QR code. Focus groups/interviews were conducted online with both students and staff to understand the challenges associated with group work and strategies to overcome them. Pseudonyms/unique codes were used when transcribing the data for anonymising and confidentiality purposes.

## Data Analysis

Template Analysis (TA) was employed to analyse all focus group/interview transcriptions using NVivo (Pro 12) (King, 1998, 2004; Brooks *et al.*, 2015). Emergent themes from students focus groups were compared with the themes from staff interviews. Questionnaire data were analysed using MS Excel. Then, quantitative, and qualitative analytical results were compared and triangulated to ensure the validity and reliability of the study findings as discussed next.

#### **Results and Discussion**

The findings through questionnaire survey and Template Analysis provide insights into the potential group work challenges and strategies to overcome them through the students' and staff perspectives.

## **Questionnaire Survey**

The questionnaire data elicited responses from students from HBS regarding their group experiences. Figure 1 and extracts from students' voices provide examples for their group work experiences.



Figure 1: Students' Experiences of Working in Groups
**S4:** Not all the people in a group contribute to the discussions.

**S7:** Not necessary to have group work in post grad.

**\$10:** Most of my group members always give excuses whenever we are having group discussion, I had this experience in consultancy skill, and I really feel bad about this.

Figures 2 to 5 demonstrate students' ratings related to their confidence in engaging in group work<sup>4</sup>.



Figure 2: Students' confidence of engaging in group work.



Figure 4: Students' confidence in addressing dominating behaviour.

Figure 3: Students' confidence to draw others to group work



Figure 5: Students' confidence in moderating own group behaviour.

<sup>4</sup> Please consider that the data were extracted from the questions 4.9 and 7 related to group work from the questionnaire distributed among the students and the complete questionnaire can be found in the link provided under Appendix 1.

Next, the results found through Template Analysis of transcriptions<sup>5</sup> (students' focus groups and staff interviews) are presented addressing the research questions one and two.

**Students Perspectives**Table 1 summarises the emergent themes from students' focus groups under challenges associated with group work/assignment and recommended strategies to overcome them in HBS at the UH.

Themes	Sub-themes	Evidence	Frequen	су
			Ref.	%
Challenges	Online	Reluctance to switch on cameras;	15	38.46
Associated		Disengagement/disconnection with group tasks;		
with Group		Technical difficulties		
Work	In-person	Cliques:	10	25.64
		Coordinating difficulties;		
	Common	Lack of concentration;	14	35.90
		Inequality of sharing time;		
		Feeling social anxiety;		
		Feeling of being left out		
Total			39	100.00
Strategies to	Online	Using chat box;	06	30.00
Overcome		Using digital reactions to communicate		
Challenges	In-person	Arranging in-class group work;	05	25.00
		Landscaping of group assignments		
	Common	Sticking with the same group for all	09	45.00
		collaborative tasks;		
		Providing clear guidelines and expectations;		
		Appointing a leader;		
		Indirect communication;		
		Questioning to gain group members' focus		
Total			20	100

Table 1: Themes Emerged from Students Focus Groups

Following example extracts from students focus groups provide evidence for emergent themes referred by this Table 1.

**S32:** Online group work is further difficult as no one switches on their camera and it is really challenging to get everyone's participation.

<sup>&</sup>lt;sup>5</sup> Each participant was given a unique code for anonymising and confidentiality purposes when transcribing data. Student participants were recognised with S(n) (e.g., S1, S2, etc.) and staff participants were indicated with SM(n) (e.g., SM1, SM2, etc).

**S12:** *I realize the other members, though showing are online. But they are not even there.* 

**\$15:** So far I've been working with my group members, all are Nigirians in my group.

**S2:** We face a big challenge on completing group assignments.

**\$17:** For example, our group could not do well and we could not do it properly as some of the group members did not prepare their slides on time and we could not complete our group presentation.

**S24:** If one talks too much and the others stay quiet or reserved, I feel kind of frustrated, maybe being dominated by the one who talks.

The design of the research attempted to bridge the contexts of the group work experiences of students expressed in the literature and the current context of those in the HBS not only through students' perspectives but through the lens of staff members.

# **Staff Perspectives**

Staff members, as revealed through interviews, demonstrated their awareness of the challenges encountered by students associated with group work. while explaining their strategies for addressing student challenges within the group work framework. Table 2 demonstrates the themes emerged through staff interviews.

Themes	Sub-themes	Evidence	Frequ	uency
			Ref.	%
Challenges	Online	Non-use of cameras:	17	35.42
Associated		Digital distraction;		
with Group		Technical difficulties;		
Work		Background distractions		
	In-person	Appropriate physical space;	12	25.00
		Time constraint with large cohorts		
	Common	Lack of students' concentration;	19	39.58
		Personality conflicts;		
		Negative group behaviours;		
		Hesitancy to collaborate individuals outside		
		their friendship circles		
Total	•		48	100.00
Strategies to	Online	Prompting students to switch on their cameras;	07	25.93
Overcome		Using breakout rooms		
Challenges	In-person	Creating a conducive physical space;	06	22.22
		Addressing personality conflicts;		
		Scheduling group tasks in partnership with		
		students		
	Common	Educating students about the benefits of group	14	51.85
		work;		
		Assigning task-specific roles;		
		Appointing a leader;		
		Offering support and resources;		
		Developing cognitive skills of compassionate		
		communication		
Total			27	100.00

Table 2: Themes Emerged from Staff Interviews

Next, example extracts from staff<sup>6</sup> interviews provide evidence for themes referred to by Table 2.

**SM 7:** In online settings, students' hesitancy to switch on their cameras can lead to misunderstandings and misinterpretations causing difficulties in building group cohesion due to failure of giving and receiving non-verbal signals.

**SM 1:** In online group work, students are more susceptible to distractions from emails, social media, or other activities. This, potentially affect their concentration and productivity.

<sup>6</sup> Please consider that each participant was identified with a unique code for the purpose of anonymising data. SM refers to 'Staff Member'. Each staff member was identified with creating a code using SM(n).

**SM 3:** If I'm trying to ask them about what's going on, 'do you need help?' There's usually a someone talking on behalf of someone, and I don't know if that's because of language barriers or because for some reason a person doesn't want to or can't speak for themselves.

**SM 4:** Some rely on the efforts of others, contributing minimally or not at all. This creates feelings of frustration and resentment among the ones who contribute more to the group tasks.

**SM 5:** Coordinating group meetings is challenging, especially when students have conflicting schedules due to academic workload, part-time jobs, or other commitments.

**SM 3:** They tend to stick with their friends, I did try to change that, but was not successful ... it was a complete and utter disaster trying to force diversity into groups.

Overall, the findings informed the challenges associated with online and in-person group work in HE through students and staff perspectives discovering the strategies to overcome them. Next, the emergent themes are discussed illuminating the pedagogical considerations answering the third research question.

# Addressing Common Challenges Associated with Group Work

Forming small groups was recommended to overcome lack of students' concentration due to group size and distractions. As group work facilitates social comparison, social learning, and social cognition (Solomon, Croft and Lawson, 2010) small groups facilitate achievement, motivation, and self-efficacy (Bandura, 2000; Hernandez et al., 2013).

The strategies of appointing a leader, assigning task-specific roles, questioning to focus, and indirect communication, were proposed to overcome members' negative group behaviours. Providing clear guidelines and expectations of group tasks, educating students about the benefits of group work, offering support<sup>7</sup> and resources<sup>8</sup> were also acknowledged. These strategies are vital for addressing personality conflicts in groups. Research highlights the facilitation of Cognitive Skills of Compassionate Communication (CSCC) to address such challenges in online (Jayasundara *et al.*, 2023) and in-person (Gilbert, 2016, 2017; Gilbert *et al.*, 2018; Harvey *et al.*, 2020) group settings.

In line with social dimensions, students proposed forming groups comprised of familiar peers while staff recognized it as a notable challenge due to students' hesitancy to

<sup>&</sup>lt;sup>7</sup> E.g., Conducting workshops on effective group work, introducing cognitive skills of compassionate communication.

<sup>&</sup>lt;sup>8</sup> Repeatedly reminding students on support available for them to enhance their academic and socio-emotional skills for example CASE, AIB,

collaborate beyond established friendships. Despite previous unsuccessful strategies, staff continues to explore effective approaches. Research discusses the advantages of culturally diverse groups in enhancing learning quality and decision making (Johnson, Johnson and Smith, 1991; Watson, Kumar and Michaelsen, 1993) being more creative and innovative in problem solving, than single culture groups (Denson and Zhang, 2010) and improving communication, collaboration, and overall group dynamics. Requirements of developing a novel, shared system of psychological tools (Kozulin *et al.*, 2003) through diversity in internationalized setting, is emphasized for students to engage in collaborative learning through social interaction (Vygotsky, 1986).

# In-person Group Work

Though conducting in-class group work was proposed to overcome the coordinating issues, it would be challenging especially with larger cohorts due to the physical space allocated in timetables. However, creating conducive physical spaces for group work would be possible through creative and innovative group work designing.

Students emphasised landscaping of group assignments expecting staff's attention on a). other religious/cultural celebrations<sup>9</sup> when scheduling group assignments, b). nonscheduling of group assignments near to seasonal/cultural/religious celebrations such as Easter, Christmas etc) as students are unable to fully attend physically and psychologically due to traveling needs to see family/friends, being busy/tired working in part-time roles, etc during such seasons. Staff can use polls to identify students' preferences before scheduling group assignments to better design effective/engaging group tasks.

# **Online Group Work**

Current results indicate non-use of cameras by students in online (Stanford University, 2020) group contexts as one of the key challenges in current HE (Bui *et al.*, 2020; Bedenlier *et al.*, 2021; Castelli and Sarvary, 2021; Gherheş, Şimon and Para, 2021). This leads to poorer interactions and less comprehensive discussions (Kim, Kwon and Cho, 2011; Kim, 2013), increasing disconnection amongst students (Stanford University, 2020), aggravating isolation (Norman, 2020), feeling insecure, helpless, and frustrated (AEDiL et al., 2021). Due to nervousness, fear of exposure, embarrassment, shyness, and the possibility of background intrusions, many students decline to switch their cameras on in online sessions (Gherheş, Şimon and Para, 2021), Other reasons include peer pressure, privacy concerns, a perceived lack of appearance to be present (Xia Zhao *et al.*, 2020; Goh *et al.*, 2021).

Conversely, research discusses increased students' engagement (Nilsen, Almås and Krumsvik, 2013), equalised participation, improved quality of problem-solving/decision-

<sup>9</sup> In parallel with UK based celebrations, students want staff to consider other celebrations significant to them such as Divali celebrations, Wesak celebrations etc.

making skills due to members' equalised eye-gaze (Vertegaal and Ding, 2002; Vertegaal *et al.*, 2003) and enhanced collaborative learning with camera use in online contexts (Pavlov, Smirnova and Nuzhnaia, 2021). Developing compassionate communication (CSCC) helps in motivating students to keep their cameras on (Jayasundara *et al.*, 2022, 2023). This can be applied in partnership with students (Felten and Lambert, 2020) and facilitates social constructivism (Vygotsky, 1978). Keeping cameras on helps minimising digital distractions through attentive screen gaze and shared virtual backgrounds, developing group cohesion and mutual learning (Jayasundara *et al.*, 2022, 2023).

Following recommendations were made to be experimented in partnership with students to overcome the identified challenges.

#### Recommendations

- Employing hybrid group allocation approach might be a potential approach to form heterogeneous groups in partnership with students (Carnegie Mellon University, 2023) facilitating multi-perspectivity.
- 2. Utilizing peer evaluation to identify inequity and address various group-related challenges (Wenzel, 2007; Aggarwal and O'Brien, 2008) and to reducing instances of free riding, improving student attitudes toward group work (Davis, 1984; Brooks, 2003).
- 3. Implementing reflective practices for students to understand their own and others behavioural attributes, and ways to manage different levels of engagement while progressing in their group learning and social cohesion.
- Reflective decision making in designing group tasks to enhance students' experiences and foster improved learning (Galton, Hargreaves and Pell, 2009; Gillies and Boyle, 2011; Chiriac and Granström, 2012) while facilitating students to focus on group process (not only task orientation).
- 5. Ensuring a safer and supportive environment for students to increase engagement and interaction (Carini, Kuh and Klein, 2006; Parsons and Taylor, 2011) and to foster exploration and collaboration (Parsons and Taylor, 2011) to achieve academic goals.
- Developing CSCC and applying shared virtual backgrounds (Jayasundara *et al.*, 2022, 2023) to address the drawback in online groups (Tam, 2000; Hrastinski, 2009) addressing social anxiety, feeling of being left-out, communicative difficulties due to language barriers and different cultural, national and ethno-religious and linguistic backgrounds.

Current findings are informed through the good practices of SoTL (Felten, 2013) and the application of CSCC in partnership with students to enhance their group experiences. The notion of students' relying on individuals who possess greater knowledge or their peers to acquire new skills, knowledge, and experiences (Vygotsky, 1978) aligns seamlessly with the current study, where properly designed group work is a mechanism that can offer students

opportunities for mutual learning. Please refer to Appendix 4 for a few examples designed to be experimented in partnership with students, reflecting these theoretical approaches.

### Conclusions

In conclusion, this research navigates the complexities of group work challenges in HE, offering insights from students and staff perspectives to better understand them with multiperspective approach. It is imperative for HEIs to embrace a holistic approach considering practical applications of pedagogical understandings towards more effective group work management. This involves not only addressing technical/logistical challenges but also prioritizing the cultivation of a collaborative culture, fostering inclusivity, and providing targeted support mechanisms. By integrating these insights into institutional practices, HEIs can empower students to navigate group work challenges successfully, fostering a transformative and enriching academic journeys for all involved. Hence, this study would be of interest in any academician irrespective of their discipline in HE especially in the UK.

#### Next Stage in the Research

One of the key academic challenges<sup>10</sup> encountered by students in HBS was selected for this research paper. The wider research focuses on experimenting in partnership with students the indicated remedial measures to better facilitate students and staff to address encountered challenges. Thus, transforming them into their aspired further study programmes and/or world of work as qualified and suitable graduates. Hence, this research is crucial for students, academics and student support services, policy makers, as it contributes to the development of inclusive teaching and support practices and help to make evidence-based decisions to enhance student experience in the HE contexts.

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<sup>&</sup>lt;sup>10</sup> Please refer to Appendix 2 and Appendix 3 for key themes emerged under academic and social challenges encountered by HBS students through the perspectives of students and staff respectively as explored in wider research.

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### Appendix 1

The complete questionnaire can be found at the link: <u>Academic and Social Challenges</u> <u>Encountered by Students at HBS, UH (onlinesurveys.ac.uk)</u>.

# Appendix 2

Themes emerged through the Template Analysis employing NVivo (Pro 12) from the transcriptions of students' focus groups.

**Table 3:** Themes that Emerged from Students' Focus Groups.

3 Themes	10 Sub-themes	Evidence F		ency
			Ref.	%
Academic ChallengesGroup WorkDifficulty of online & in-person group working group assessments; Students' attention span, inequality of contribution (monopolising/ non-contribution); reluctance to group with students out of their friendship circles/ from diverse backgrounds		39	28.26	
	Managing Academic Stress	Language barrier (terminology/accent); Academic workload; Lack of clear instructions for assessments; Assessment landscaping; Commencing education as adults	27	19.57
	Academic Engagement	Unfamiliarity of mode of teaching; Lack of awareness on supportive services; Difficulty of approaching lecturers; Changing lecturers; Feeling bored; Canvas site	21	15.22
	Academic Writing and Digital Skills	Academic essay and report writing, Referencing; IT skills and statistics	08	05.80
		Sub Total	95	68.84

Social Challenges	Adjusting to new environment	Weather; Multicultural setting; Diversity	14	10.14
Building Friendship		Concerns on sense of belonging	04	02.90
	Commuting	Time constraint; Economically influencing	04	02.90
		Sub Total	22	15.94
Managing work-life balance	Financial commitments	High cost of living; tuition fee burden; Cost of transportation	07	05.07
	Accommodatio ns and transportation	Issues in accommodations; Lack of well-timed transportation	07	05.07
	Managing part-time work	Clashes of academic time tabling with work Schedules; labour intensive working.	07	05.07
		Sub Total	21	15.22
		Grand Total	138	100.00

# Appendix 3

Themes emerged through the Template Analysis employing NVivo (Pro 12) from the transcriptions of staff interviews.

Table 4: Themes Emerged from Staf	Interviews
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3 Themes	7 Sub-themes	Evidence	Frequen	ю
			Ref.	%
	Group Work	Difficulty of online & in-person group working; Students' attention span; reluctance to group with students outside their friendship circles, Speaking on behalf of non-contributors.	48	45.28
Academic Challenges	Lack of students' Engagement	Less attendance; Supportive services; Online sessions (full present and active participation); Canvas site	45	42.45
	Managing Academic Stress	Language barrier; Academic workload; Commencing education as adults	10	9.43
	Academic Writing and Digital Skills	Academic essay and report writing; Referencing; Poor IT skills	05	4.72
		Sub Total	86	81.13
Social Challenges	Commuting students	Lack of active participation to social events at the UH	10	9.43
		Sub Total	10	9.43
Managing work-life balance	Financial commitments	High cost of living; tuition fee burden	04	3.77
	Managing part- time work	Students' prioritising of their work over academic Schedule		5.66
		Sub Total	10	9.43
		Grand Total	106	100

#### Appendix 4

Examples for designing inclusive and engaging group activities for effective groups work.

These are some of the approaches the research expects to apply and experiment with the students in near future.

### 1. Hybrid group allocation

This approach will allow to increase diversity in group in partnership with students.



Figure 6: An Example for Hybrid Group Allocation.

Staff can invite students to make 1st and 2nd choices of their preferred members to be grouped with (this can be done using an online poll). The staff member can decide other two students to each group focusing the diversity. Thus, the group will be comprised of for example four group members selected through students' preferences and staff member's allocation. This hybrid group allocation (Carnegie Mellon University, 2023) approach would facilitate forming groups with diversity while addressing the issue of students' hesitancy to group with individuals beyond their friendship circles/ or group with familiar individuals only.

# 2. Employing Peer Evaluation for Group Work

**PE can be applied for any kind of a group work in any module where ALL** members of the group will assess **ALL** group members including themselves. The marks to be awarded can be decided depending on the module requirements (e.g., 50% of the group report or 75% for the group presentation, 100% for the group discussion etc.).

- Staff will award a group mark out of allocated total marks for the entire group and then it will be factored by the PE score to arrive at individual mark (e.g., staff will award a group mark out of 100 for the entire group for group discussions and then it will be factored by the PE score to arrive at individual mark.
- Staff will educate students about the procedure of PE before commencing the group work regarding the exacts dates the PE opens and closes and how the group members can submit their PE (e.g., students will be emailed a link to submit their evaluations within a week from Jan. 29.2024 Feb. 05,2024).
- Students will be made aware of the following points to ensure clarity and fair treatment.
  - Peer and Self Evaluation scores will determine the final individual PE score for each student.
  - This will then be applied to student's Group Mark.
  - Where appropriate this may result in an individual student's mark being adjusted UP or DOWN.
  - Outside of PE score adjustments Staff have the discretion to intervene in adjusting marks. These are in situations of evidence of poor engagement with the coursework and/or misuse of or inappropriate voting in the peer evaluation.
- Deciding PE criteria (This can be designed in partnership with students).

 Table 5: Example Peer Evaluation Criteria.

Criteria	Supportive	Scores			
	Questions	1	2	3	4
Criteria 1: Collaboration and Active Participation To what extent do you believe a group member contributed to the various tasks and workload shared.	<ul> <li>Did they attend all the meetings you held?</li> <li>Did they take part in any online correspondence you held?</li> <li>Were you/they willing to accept their/your fair share of the workload?</li> <li>If someone had to do extra, did any one volunteered to do that or someone was pressured into doing so?</li> </ul>	Did not participate al all or share the workload.	Sometimes participated and shared the workload fairly.	Participate and shared the workload fairly.	Participated proactively and was always ahead of tasks and
Criteria 2: Teamwork How effective a team player a group member was, playing a useful team and contributing to quality of the group work.	<ul> <li>Did the group member what was expected if a task assigned?</li> <li>Did the group member play a specific useful role in the team facilitating the group work process?</li> <li>Did you/others respected individual</li> </ul>	Group member did not assume their role at all or assumed it in a non- productive manner.	Group member sometimes assume their role or often dominated the group.	Group member assumed their role in an appropriate way or was respective to feedback and improved their role contributing to cohesive	Group member totally assumed their role, helped the group stay on track, encourage group participation, and having a positive attitude and

	differences an attempted to develop a cohesive work culture	d		group culture.	cohesive work culture.
Criteria 3: CSCC (Active listening, managing group behaviours, sharing equal opportunity) How each group member act towards you and other group members in terms of listening when communicating with each other about group work.	<ul> <li>Was the group member prepared to le you/others hav your/others' sa</li> <li>Do you think y were allowed a equal opportunity to contribute to a discussion?</li> <li>If you felt reluctant to speak, did any other group member help encourage you do so?</li> <li>Did you notice any positive meditations (verbal/non- verbal) from a group membe to encourage you/others?</li> </ul>	<ul> <li>Group</li> <li>member did</li> <li>not use any</li> <li>CSCC (active</li> <li>listening,</li> <li>using</li> <li>verbal/non-</li> <li>verbal cues to</li> <li>encourage</li> <li>you/others)</li> <li>and often</li> <li>interrupted</li> <li>them.</li> </ul>	Group member sometimes use CSCC (active listening, using verbal/non- verbal cues to encourage you/others) and sometimes interrupted them.	Group member use CSCC (active listening, using verbal/non- verbal cues to encourage you/others) but sometimes was not sharing equal opportunity.	Group member actively engaged in using CSCC (active listening, using verbal/non- verbal cues to encourage you/others) ensuring equal opportunity for everyone in the group.

Criteria 4: Constructive Feedback How constructive and useful was the feedback you/others given/received related to group work from the group member	<ul> <li>To what extent the group member offer feedback?</li> <li>Did you feel encouraged, especially by positive feedback?</li> <li>Even if others did not agree with you, were they constructive with the comments they gave you?</li> <li>Whether positive or negative, was their manner and language professional, appropriate and constructive?</li> </ul>	Group member did not offer constructive or useful feedback.	Group member sometimes offered constructive feedback, but sometimes the comments were inappropriate or not useful.	Group member offered constructive feedback when and where appropriate.	Group member offered detailed constructive feedback which are very much useful and appropriate.
Criteria 5: Time Management	How did each group member meet the deadlines which were agreed within the group?	Group member did not complete any or most of the assigned tasks on time and often forced the group to make last minute adjustments and changes to accommodate missing work.	Group member sometimes did not complete assigned tasks and help up completion of group work at the last minute.	Group member completed all assigned tasks on time but did not hold up progress on the completion of group project/work because of incomplete work.	Group member was very proactive and completed assigned tasks ahead of time.

# A worked example of marks

Students	S1	S2	S3	S4	Total Awarded
S1	4	4	3	3	13
S2	3	4	3	2	12
\$3	4	4	4	4	16
S4	1	2	3	2	08
Total Received	12	14	13	10	

**Table 6:** Example for PE marks given and received by students in a group of four.

The rows across are the marks awarded by each student, whereas the columns down shows the marks each student received. The marks received are totalled at the bottom.

- Normalise the Scores Awarded by each Student.
  - All the marks each student awarded are added up (total up each row).
  - Once it is known how many marks each student has awarded, the fractional score for each student can be calculated. In other words, every student in the group has an identical 'pizza', but they can give different sized slices to each other.
  - S1 awarded a total of 13 marks (so her pizza was split into 13 slices). These are the fractions awarded by S1 to each student. As a test, all the fractions can be added up and they should equal 1.
  - This process is repeated for every student for every question. In this example there is only one question so we only need to add up this one question.

**Table 7:** Normalising the Scores.

Awarded marks are added.	S1 awarded: 4+4+3+2 = 13 mark	ks
(for one criterion only)	S2 awarded: 3+4+3+2 = 12 marks	
	S3 awarded: 4+4+4+4 = 16 mark	ks
	S4 awarded: 1+2+3+2 = 08 mark	ks
How to calculate factorial scores	S1 gave herself 4 marks = 4/13 =	= 0.31
(for one criterion only)	S1 gave S2 3 marks = 3/13 =	= 0.23
	S1 gave S3 4 marks = 4/13 =	= 0.31
	S1 gave S4 1 mark = 1/13 =	= 0.08

- Calculate the PE Score awarded to each Student.
  - Before each students PE score is calculated, there's one more bit of information that is needed; how many students were in the group, and how many of them submitted marks.
  - In a case the group had 4 members, which means 4 pizzas should be split between 4 members. If one group member didn't submit any marks, so only 3 pizzas are available!
  - To compensate, PE calculates a multiplication factor to bring the total number of pizzas back up to 4. This value is identified as the "fudge factor".
  - Application of Fudge Factor happens only if there was a non-voting member who had participated in the assessment. When there are members Absent from the assessment throughout, and are awarded an Absent as the grade, Fudge Factor would not apply. PE score will be calculated omitting the Absent student (i.e., a 4-member group would be considered as a 3-member group) 4 (students in group) / 3 (students submitting) = 1.25 (our fudge factor).
  - The PE scores can now be calculated.
- Fractional scores awarded to the members of the group.

Example for Student 1:

S1 awarded herself 0.31 (4/13)

S2 awarded S1	0.25	(3/12)
S3 awarded S1	0.25	(4/16)
S4 awarded S1	0.13	(1/8)

If all the individual factors are added up, the PE score is calculated,

S1's PE score = = 0.31 + 0.25 + 0.25 + 0.13 = 0.94

If everyone had submitted the assessments, that would be fine, but if a sudent did not submit marks, the fudge factor should be applied multiplying the PE score with the fudge factor (i.e., PE Score x the fudge factor).

- Calculate the Final group work grade for each student.
  - If 50% was awarded for this group work.
  - Ordinarily, this may have given everyone in the group 50%, but now using the PE scores to give either proportionally higher or lower marks according to the students' actual performance.
  - S1's overall mark after adding the PE score = 0.94 x 50 = 46.75

According to the peer evaluation, the group members gain fair treatment/result as to their engagement and considered criteria in the group task. Hence, this can be applied to enhance and ensure students' partnership and their contribution towards awarding and receiving fair results to each group member. This can be applied to inform the good practices in SoTL (Felten and Lambert, 2020), supporting towards social constructionism (Vygotsky, 1978)and also in line with assessing compassion (Gilbert, 2016; Gilbert et al., 2018; Harvey et al., 2020) to facilitate students better manage their group work.

# 3. Applying Cognitive Skills of Compassionate Communication

Each group should be comprised of four students and all students are invited to self-choose and read two journal articles related to their subject discipline. The procedure to be applied in any in-person or online (using breakout rooms) setting is outlined below.

# Step 1: Students' Group Meetings

• The group decides the order of presenting their journal articles at the initial point and then, each group member presented a self-chosen journal article from their own subject field to the group.

- After that, all group members joined the follow-up group discussion of the presented journal article where the whole group discussed it.
- This procedure is repeated until all four members finish their presentations and complete follow-up discussions in each group.

# Step 2: Introducing Cognitive Skills of Compassionate Communication (CSCC)

Students are introduced CSCC through a 90-min developmental training to apply CSCC for their task-focused group meetings (online or in-person). During this interactive intervention session, participants were introduced to the key theory of compassion in terms of human brain functioning in particular emotional regulatory systems. This included an explanation of the psychobiological model of compassion (The Compassionate Mind Foundation). Then, the group members were introduced to practical strategies for developing CSCC to be applied in their group settings. The design of the intervention session allowed students to understand the science-based rationales for their using the following practical strategies of CSCC to help students demonstrate their full attention to all members in the group.

# Step 3: Experimenting students' practical application of the CSCC in their group settings.

Group members are invited to bring their self-chosen second journal article and apply the CSCC strategies they learnt during this group session.

- The same groups (as in presenting and discussing their first journal article) takes part in their second group work meeting.
- Students are given the opportunity to decide the order of presenting their journal articles to the group.
- Each group member presents their second journal article selected from their own related to their subject field.
- Then all group members joined the follow-up group discussion in relation to the presented journal article.
- This procedure is repeated by all members in each group until all four journal articles are presented and discussed by the group.

Application of CSCC has been found to enhance students social and learning experiences while enhancing their psychological safety including the notion of equal agency within their groups. Further in online contexts, enhancement of students' motivation to switch on their cameras were reported through their understanding of the practical application CSCC using non-verbal cues and signals to help one another in online settings (Jayasundara *et al.*, 2022, 2023). CSCC can also be used to assess task-focused group work.

Therefore, the research is hopeful applying the stated theoretical approaches to better facilitate students group work in HE. Through these practical solutions, this research can lead towards more inclusive, effective, and culturally sensitive teaching and learning practices in HBS, UH. The findings not only provide advantages to students but the entire academic community to take multi-perspective aspect into their teaching and learning. The findings of the research offer valuable insights into fostering inclusive teaching practices, enhancing student engagement, and developing culturally sensitive learning environments.

# Investigating Engagement in Pre-class Learning Content in Flipped Classroom Approach for Pre-registration Nursing Student.

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#### Abstract

The Flipped Classroom (FC), also referred to as the inverted classroom is a multifactorial educational methodology that has shifted the paradigm of traditional nursing education into an active and immersive learning experience. For this to work effectively, students must complete directed online learning activities, usually at home and then apply the knowledge in problem-based classroom activities followed by feedback. As a result, the classroom becomes more interactive, enabling nursing students to engage in complex tasks. However, this is challenged by students often arriving unprepared for collaborative activities due to neglecting pre-class learning. Despite the reported benefits of the FC approach, a noticeable lack of attention is given to students' subjective experiences and struggles amid the shift. This article examines the impact of pre-class learning and teaching strategies on nursing student engagement. A student survey collected responses from 33 pre-registration nursing students to explore students' experiences in accessing and interacting with educational materials. Based on the qualitative data, it was found that while the participants appreciated the flexibility in learning and studying in conjunction with their daily lives, they faced challenges in accessing and comprehending the online activities and felt unsupported. The findings also indicated that the participants required additional time and personalised guidance to effectively participate in the flipped learning experience. The contribution of this article is also to provide recommendations for improving the teaching and learning process and offer suggestions on how to enhance overall student engagement.

#### Introduction

In the ever-evolving complex healthcare arena, nurses confront redoubtable challenges shaped by involuted social, technological, and medical factors (Evans et al., 2019). The safety and well-being of patients are intricately linked to nurses being equipped to navigate complexities beyond preserving professional integrity (Njie-Carr et al., 2017). Recognising this growing need, Approved Education Institutes (AEIs) have transformed the delivery of nursing education, embracing a student-centred pedagogical approach. This paradigm shift aims to support nurses as perpetual learners, capable of adapting to the dynamic demands of the healthcare sector (Cho & Kim, 2021) as well as be a part of a workforce that is reflective of the diverse population (Iduye, 2021).

The Standards Framework for Nursing and Midwifery Education, established by the Nursing and Midwifery Council (NMC), underscores the pivotal role of AEIs in empowering and guiding students toward reflective practices and lifelong learning (NMC, 2023). Additionally, it advocates for a diverse array of learning opportunities and the provision of suitable resources, fostering the attainment of

programme outcomes and the manifestation of professional behaviour (NMC, 2023; UH Learning Principles, 2022).

As technological advancements continue to reshape educational landscapes in this digital age, classrooms have not been exempted from transformation. One notable instructional model that has gained prominence in the past decade is the Flipped Classroom (FC), capturing the attention of educators and scholars alike (Lee et al., 2022). This innovative approach to teaching, employed globally across various disciplines, is valued for enhancing students' experience as an active learning approach (O'Mahony & Cork, 2017; Murphy et al., 2022; Aydin & Demirer, 2022). It blends two core elements (a) Pre-class learning, direct computer-based learning outside/before the class followed by (b) in-class practice, interactive group activities based on the pre-learning inside the class (O'Mahony & Cork, 2017).

#### Background

The inception of Flipped Classroom was driven to address the practical challenges faced by students who missed traditional classes. Bergmann and Sams introduced an innovative approach in 2007 that accommodated diverse student circumstances (Bergemann & Sams, 2012, p4; Barranquero-Herbosa et al., 2022). The establishment of the Flipped Learning Network (FLN) in 2014 further solidified FC as a recognised pedagogical methodology, emphasising its collaborative and inclusive nature to meet the evolving needs of students and the academic landscape (Barranquero-Herbosa et al., 2022).

Flipped learning has reversed the traditional approach (as shown in Figure 1: Dove & Dove's traditional and flipped classroom comparison) of in-class teaching followed by homework. Instead, the instructor creates intentional learning content such as assigned readings and instructional videos, demonstrating, or explaining fundamental concepts (Brewer & Movahedazarhouligh, 2018). The learners explore materials in a self-directed manner at their own pace before class and apply their knowledge collaboratively in class (Demirel, 2016; Brewer & Movahedazarhouligh, 2018).



Figure 1: Dove & Dove's comparison of the traditional and flipped classroom approaches, (2015).

# The Flip in Nursing Education

In the nursing profession, where practical application is paramount, the flipped classroom approach not only enhances critical thinking but also nurtures the practical competencies essential for nursing professionals, contributing to a more comprehensive and relevant education (Ozbay & Cinar, 2021). Research findings support the effectuality of the flipped classroom in nursing education, indicating enhanced high-order thinking, engagement, and academic performance along with optimising class time (Baytiyeh, 2017; Evans et al., 2019; Chen et al., 2021).

Therefore, a significant aspect of nursing education is the practice modules, which involve using the flipped classroom technique to teach practical skills related to patient care (DMD-7HSK028, 2023). In a flipped environment, students are encouraged to take ownership of their learning (Advance HE, 2020) by completing specific tasks that focus on fundamental concepts regarding a disease condition before class such as recognising, remembering, and understanding the anatomy, physiology, and pathophysiology (basic cognition). In the class, the emphasis is on the application of facts in patient assessment, analysis, evaluation, and creation of care plan based on assessment (high-order cognition) which aligns well with the principle of Bloom's revised taxonomy (Figure 2) (Han & Klein, 2019; Goedhart et al., 2019; Naciri et al., 2022).



**Figure 2:** Example of Flipped classroom design in Nursing Module for respiratory conditions aligned with Bloom's Revised Taxonomy (created using Microsoft smart-art graphics).

However, the idea may be debatable if learners who cannot progress beyond a basic level of understanding may face difficulties in achieving higher levels of cognition, which can impede their overall progress and success. Therefore, rather than solely relying just on providing the material, educators need to ensure that the pre-learning material accompanies teachers' explanations and communication channels to ensure learners have a firm grasp of fundamental concepts before advancing to complex topics (Youhasan et al., 2021).

The adoption of a flipped classroom approach proves valuable in the context of widening participation in university also where diverse student background and other obligations like work and family often intersects with academic commitments (Mathias et al., 2023). The flipped classroom's asynchronous access to foundational content accommodates these diverse schedules, providing learners with the flexibility needed to balance their academic pursuits with other life commitments (Goedhart et al., 2019; Iduye et al., 2021). This inclusivity promotes accessibility and equity, facilitating deeper learning and aligning with the mission of widening participation in institutions to create educational opportunities for a diverse student body (UH-APP, 2022).

#### Literature Review

The flipped classroom model is an interactive teaching method that involves a studentcentred active learning approach (Busebaia & John, 2021). The aggregated research indicates the effectiveness of flipped learning in increasing students' learning performance and enhancing engagement (O'Mahony and Cork, 2017; Hew & Lo, 2018). A literature review explored previous research and highlighted the potential of implanting the FC in seven different disciplines in higher education. It concluded that flipped learning positively impacts student outcomes in fields like medical and health sciences, natural sciences, social sciences, and humanities. The study also suggests that implementing this model has resulted in significant improvements in students' participation and perception along with enhanced engagement, metacognition, performance, and comprehension. (Al-Samarraie et al., 2020).

Likewise, another systematic review based on 61 studies from 18 databases revealed that FC methodology is more effective than other methodologies, in terms of learning achievements although, skips effective constructs such as motivation and engagement (Galindo-Dominguez, 2021). Adding to the evidence, a qualitative study for a graduate nursing programme reported significant improvement in students' acquisition and application of higher-order thinking (Murphy et al., 2022).

One of the benefits of FC is providing unrestricted, flexible access to resources for students to re-visit the material multiple times until they fully understand the fundamental concepts. This approach encourages a growth mindset and allows students to take control of their learning (Barranquero-Herbosa, 2022) helping them manage their cognitive load (Abeysekera & Dawson, 2014; Goedhart et al., 2019). Secondly, in-class active learning activities enhance the understanding of the subject matter providing opportunities for applying theoretical knowledge into practice (Hew & Lo, 2018) bridging the education-practice gap.

Along with increasing peer interaction in the class, while learners are collaboratively working on problem-based activities and supporting each other (Balan et al., 2015; Godhart et al., 2019; Advance HE, 2020), teacher-learner interaction is also enhanced (Konijn et al.,2018; Barranquero-Herbosa, 2022). Educators can provide immediate feedback and engage with more students to facilitate a scaffolded understanding of the concept (the assistance given to students to help them with problem-solving) (Yang, 2020; Chen et al., 2021), and use class time to provide individualised support (Balan et al., 2015). Furthermore, along with autonomy the collaborative nature of flipped classrooms fosters a sense of competence (embedding self-assessment that enables them to determine their strengths and weaknesses) and relatedness (working with peers) among students (Abeysekera & Dawson, 2014; Persky and McLaughlin, 2017), crucial for motivating students and the success of a widening participation institution.

#### The Associated Challenges

Flipped classrooms offer exciting learning opportunities but challenges like low engagement, absence of immediate feedback, problems with the course structure, lengthy videos, and time required to understand the material (Al-Samarraie, 2020). Although pre-class learning serves as a gateway to facilitate in-class learning, engaging all students in pre-class learning remains a top concern for educators (Lee & Choi, 2019). Being bidirectional, engagement

also encompasses how the institution utilises its resources and structures the curriculum to facilitate students' participation in activities that contribute to meaningful learning experiences (Iduye et al., 2021). Posting pre-recorded lectures or text readings alone does not guarantee either student engagement (Karanicolas et al., 2016), or provide students with sufficient time and effective resources for class preparation (Fisher et al., 2023).

Secondly, diverse learners' characteristics like cognitive style, time management, media preferences, and learning strategies (self-regulation and self-direction) are another issue in student engagement (Lee & Choi, 2018). Also, some students perceive outside-the-class learning as an additional supplementary task (Brewer and Movahedazarhouligh, 2018). A further problem associated with pre-learning engagement rooted in the FC format is students' inability to get feedback and ask questions immediately while learning outside the class (Akcayir and Akcayir, 2018).

Thirdly, the modalities of learning material are additional challenges as the educational faculty may not be trained in creating engaging content (Anolak et al., 2018) and is 6 times more time-consuming than the traditional lecture preparations (Akcayir and Akcayir, 2018). They may also, struggle to assess the cognitive load of new learners, a normal cognitive bias also referred to as an "expert Blind Spot" (Fischer et. al., 2023). Even though theories like Cognitive Load theory (CLT) have supported multimedia learning, online encyclopaedic preparatory content can be overwhelming for the learners leading to inadequate preparation and impeding learning (Lee & Choi, 2019; Fischer et. al., 2023).

Lastly, nursing students often prioritise passing assignments but also recognise that their efforts outside the classroom truly help them understand the clinical subjects. Assignments can be helpful for academic discipline but also cause stress and burden for students and their families. (Aydin and Demirer, 2022). It's evident from above that standardised design frameworks are still lacking despite the emerging empirical evidence regarding instructional design for the flipped classroom.

#### Impact of Pre-learning

Although the consensus seems to be that the in-class activities are more critical to FC, Preclass activities within the flipped model serve a crucial purpose, acting as a preparatory phase aimed at equipping students with the foundational concepts necessary for the subject at hand (Karanicolas, 2016) and have a significant impact on the overall success of Flipped classrooms (Jensen et al., 2018). Based on the constructivist roots, where learners learn and develop by constructing their knowledge, this critical component of the pedagogical approach seeks to align students with the intended learning outcomes, fostering a solid understanding of core principles before the in-person session (Persky & McLaughlin, 2017; Aydin & Demirer, 2018). The significance of pre-learning becomes even more pronounced in the context of nursing education. The effective flip relies on students being prepared for the class with the same understanding of the topic's foundation concept. For obvious reasons, under-prepared students find it difficult to contribute equally during the in-class activities which could even demotivate the well-prepared students (Lee & Choi, 2019) adding criticality to the overall success of FC. This prompts an inquiry into the extent to which pre-learning contributes to knowledge acquisition and the active involvement and participation of students in the learning process (Liu et al., 2018).

#### Research Methodology and Data Collection

This research aims to investigate the student engagement process with the learning resources available and to improve learning experiences. Data is collected anonymously from Level 7 pre-registration nursing students in a practice module from diverse ethnic backgrounds including neurodiverse students via an online student questionnaire. The questionnaire included 10 questions presented in Table 1 (Appendix 2). Questions 1-5, 7, 9, and 10 were open-ended questions and Questions 6 and 8 were closed Likert scale type. Module Analytics was also investigated to find out the average participation of 72 nursing students who viewed the module content in 14-week periods of the practice module (from 11-09-23 to 11-12-23). A mixed-method approach is used to analyse the data and the outcome of this data is used to reflect upon the teaching and learning environment and identify objectives for future practices.

# Data analysis

The analytics on the module website revealed how many students viewed the content and the average level of participation every week during the practice module although it did not provide information on how engaged students were with the learning resources (Figure 3).



**Figure 3** The Average view page and average participation for 72 students during the practice module teaching.

The survey was sent to all 72 nursing students and 33 students participated and responded to the survey. Questions 6 and 8 were analysed using numerical encoding to assign a value to the selected responses (Appendix 3). According to the report, 28% of students preferred face-to-face learning, while 70% of learners liked remote learning because of its flexible nature. 29% of respondents found remote learning less distracting, and 50% experienced less stress in the home environment. However, 42% of learners felt that they were not learning as much as they would in the classroom due to information overload, with 37% finding it difficult to understand and seek clarification which is a significant number. In terms of motivation, 17% of learners stayed neutral, while 44% disagreed, however, 40% of students find it challenging to stay motivated for assignments.

To understand this better, a thematic analysis of open-ended questions was conducted. A thematic analysis method is used to identify patterns within the data and establish relationships between the patterns (Castleberry & Nolen, 2018). The initial codes were identified from collating the data, organised, and integrated into themes. Two main themes identified from students' responses to open-ended questions are, (a) Accessible and engaging resources and (b) Scaffolded support. The primary factors that motivated learners for remote learning were the convenience of meeting assignment deadlines and access to a variety of learning resources. However, the demotivating factors that hindered remote learning included lengthy resources, distractions, lack of time, due to other commitments and insufficient support. In response to these problems, learners expressed their desire for more personal support from tutors, engaging resources, and sessions that included mini quizzes or assessments. While learners appreciated the convenience and time efficiency of remote learning, they suggested that timetable sessions and extra classes for struggling students could be beneficial.

#### Discussion of Key Findings and Recommendations

The key to success with the flipped model is to strike an optimal balance between in-person and online learning experiences, as the two must work in tandem to achieve the desired results (Lee & Choi, 2019). As the flipped technique requires nursing students to do prelearning before the sessions, students new to this teaching method may resist the change from traditional teaching methods (Balan et. al., 2015). Educators should prepare them for different classroom learning cultures and pre-learning courses to ensure effective learning (Balan et.al., 2015). Clear guidelines and time-effective learning strategies should be communicated at the beginning of the module to shift study load distribution without increasing workload by FC. (Yang et al., 2020).

Despite the reduced visibility of the educator in the FC model (Chen et al., 2021), the feedback from student nurses indicates that they demand increased interaction and support from their teachers adding more evidence to the archive. Educators' added curriculum support can enhance students' participation in the iteration of learning and create meta-awareness (Chen et al., 2021). Given the need to support learners and consolidate their participation with the learning resources, interaction tools and communication channels should be carefully integrated enabling students to ask questions, discuss issues immediately and get timely feedback (Yang, 2020).

Addressing the issue of lengthy resources, pre-class activities should be brief, engaging, and centred around important nursing concepts (Karanicolas et al., 2016) and should be aligned with the learning objectives (Han & Klein, 2019). The multimedia or reading material should be carefully curated to match the learners' attention span to ensure effective engagement (Akcayir & Akcayir, 2018). According to Jensen et al. (2018), using multimedia resources that stimulate multiple senses is crucial for effective learning. By engaging with audio, video, and text, learners can process information in a way that can enhance their conceptual development and challenge their cognitive abilities. This approach can help individuals to better retain material and reconstruct their cognitive architecture (Jensen et al., 2018).

While most of the effort is typically devoted to pre-class and in-class activities, it's crucial to keep in mind that learning should not come to a halt at the end of a class session, instead, it's essential to provide opportunities for ongoing practice. Karanicolas et al. (2016) emphasised a collaborative and collegial development of the instructional framework and suggested incorporating post-class activities after pre-class and in-class activities for further support and continue the learning (Figure 4) which was later supported by Persky and McLaughlin (2017) and Youhasan et al. (2021).


**Figure 4:** Example of Step-up Conceptualization of instructional design framework (based on design template by Karannicolas et al., 2016) (created using smart art graphic feature in Microsoft Word).

Assignments are an important part of a nursing student's academic journey (Aydin & Demirer, 2018) and in-class sessions in FC provide an excellent opportunity for learners to work collaboratively on assignments with the guidance of their peers and instructors. Educators should also assess learners' understanding of learning resources in the class with a mini-quiz or mini-assignments where students can interact and ask questions (Naber & Best, 2016). Educators should prioritize the purpose of learning above the content itself which is also supported by Youhasan et al. (2021) in nursing education by the expression of 'contextual compatibility' for the success of FC. This doesn't mean that the content is not important, but by understanding the context in which the content is presented like linking to real patient scenarios, teachers can ensure that learning extends beyond the classroom (Zukergood et al., 2023).

McCauley et al. (2015) proposed incorporating "hooks" into lesson instructions that generate learners' curiosity (based on a collaborative design project with educators in the fields of physics, chemistry, and biology at the National University of Ireland, Galway). A hook is referred to as a pedagogical strategy that simply captures attention to the topic and serves as an enticement for learning. This teaching tool can be as simple as incorporating some curiosity questions e.g., "What next" or "What happened" in a short story, in a video clip, or in a basic demonstration to make learning more relevant and engaging by making it relevant in their life (McCauley & McHugh, 2021). It will strengthen professional practices and student engagement, though there is minimal research and no scholarly evidence of the pedagogical values of educational hooks in nursing education and should be examined in future.

#### Limitations of the study

The data collected was only based on a sample of pre-registration students from a single module at one institute. The research solely focused on students' epistemological and

personal beliefs. The data collection was limited by time constraints, which made it difficult to gather sufficient information throughout the course. Much work is yet to be done to comprehensively analyse other contributing factors in a large and diverse sample size such as the content of the course in FC as well as demographics and institutional factors which may impact students' learning outcomes.

#### Conclusion

After analysing the content and reviewing the literature, a conclusion can be drawn, that nursing students struggle to engage with learning resources during pre-class activities. The findings suggest that non-compliance can be improved by focusing on specific areas. Karanicolas et al. (2016) as well as Lee and Choi (2019) have concluded that the strategic design or framework with high-quality content within a time frame is the key to success for FC which was further confirmed by Yang et al. (2020). By personalising pre-class activities to students' diverse needs, tutors can support students in managing their cognitive load (Konijn et al., 2018; Goedhart et al., 2019). The current imperative in nursing education extends beyond the mere transmission of content; it demands the cultivation of proficient and skilled nurses prepared for the challenges of real-world practice. This responsibility encompasses not only mastery of professional skills but also the promotion of reflective practices, as articulated by Marie and Garrett (2021). Flipped Classroom is a pedagogy that has the potential to bridge the gap between education and practice in nursing as well as in other disciplines. Well-designed and monitored pre-class learning activities can improve the intended learning outcome of FC.

Regardless of true classification in the educational paradigm, the existing findings emphasised the benefit of FC resulted from the logical connection between all the different steps, rather than sticking purely to the model. That highlights the empirical importance of student-teacher interaction and scaffolded support is evident for the succession of FC (Anolak et al., 2018; Konijn et al., 2018; Chen et al., 2021; Youhasan et al., 2021). The transformative potential of flipped learning in revolutionising traditional classrooms is evident and promising. It is important for education decision-makers to understand the challenges that students may face and to consider effective interventions to eliminate them allowing educators to tailor learning to individual students' needs and styles, thereby creating a personalised educational journey (Mathias et al., 2023). To maximize its impact adept use of technology can be utilised to promote essential skills of digital literacy for the present century (Advance HE, 2020) creating dynamic, interactive learning environments fostering active engagement, critical thinking, and problem-solving. Future research endeavours could also explore strategies that cultivate positive student perceptions towards pre-class learning, adding depth to effective pedagogical approaches in nursing alongside other disciplines. Not only it will validate the effectiveness of pre-learning in enhancing selfdirected learning but also shed light on the nuanced ways in which students actively engage with the material.

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# Illustration

Figure 1: Dove & Dove (2015), *A comparison of the traditional classroom and the flipped classroom approaches*. In: Audil, A. & Saidalvi, A. (2018). The Implementation of Communicative Language Teaching in Iraqi English Language Classrooms - Scientific Figure on ResearchGate. Available at: <u>https://www.researchgate.net/figure/A-comparison-of-the-traditional-classroom-and-the-flipped-classroom-approaches-Dove\_fig3\_337113856</u> [Accessed 16 Nov 2023]

# Appendix 1: Link to the summary of the survey:

https://forms.office.com/e/bxUtbMkS9r

# Appendix 2: The student's Pre-session learning survey questionnaire

Q 1	How do you feel about remote learning?
Q 2	Approx how much time do you spend on self-directed/remote learning?
Q 3	What device do you use to access the pre-session learning resources?
Q 4	Do you have a reliable internet connection at home so you can complete your assignments without interference or delay?
Q 5	What type of learning do you enjoy the most?
Q 6	On a typical remote learning day, how strongly do you agree or disagree with the following? (a), I like working at my own pace. (b) I like setting my own daily schedule for learning. (c) I'm less stressed about my learning. (d)I feel I'm learning more at home than in class. (e) It's easier to focus without distraction. (f) it's nice to have a break from the stress of the university environment.
Q 7	What do you like about remote learning? What works well for you? What motivated you to engage with learning resources?
Q 8	On a typical remote learning day, how strongly do you agree and disagree with the following? (a) I'm more easily distracted at home than in the classroom. (b) I have difficulty staying motivated to complete my assignments. (c) It's hard to keep class and home separate. (d) I sometimes have difficulty understanding online assignments. (e) I feel that I'm not learning as much as I would in the classroom. (f) teachers are assigning too much homework. (g) I need class discussion to learn.
Q 9	Are there any other challenges? What aspect, do you struggle with? /What demotivates you to engage with learning resources?
Q 10	Share additional suggestions for how your teacher or school can help you become more engaging with learning resources.



### Appendix 3: Stacked bar chart of responses to questions 6 and 8

#### Legend Completely disagree Somewhat disagree Neutral Somewhat agree Completely agree

I'm more easily distracted at home than in the classroom	28%	21	% 10%	24%	17%
I really need class rooms to learn	27%	2	27%	20% 10%	6 17%
I feel that I'm not learning as much as I would in the classroom	20%	23%	20%	<mark>17%</mark>	20%
I sometimes have difficulty understanding online assignments	20%	17%	13%	27%	23%
I have difficulty staying motivated to complete my assignments	17%	23%	17%	27%	17%
It's hard to keep class and home separate	13%	20%	27%	23%	17%
Teachers are assigning too much homework now	3%	34%	34%		21% 7%
(	כ	20	40	60 80	) 100
			Percent	ages	

Accessibility of online learning resources in higher education; are elearning resources in an occupational therapy degree apprenticeship accessible to all learners?

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#### Abstract

Online learning has become integral to many higher education degree programmes, including occupational therapy. Accessibility of e-learning resources is essential, being mandated by legislation and necessary to enable participation in education for all learners. Online learning resources from universities need to be in compliance with current Web Content Accessibility Guidelines (WCAG), although several considerations for accessibility fall outside the scope of these guidelines such as lecture recording and advance publication of lecture resources.

The focus of this study was to quantitatively determine the accessibility of online resources for a module within an occupational therapy degree apprenticeship. This study found that although many resources were compliant with accessibility guidelines there were notable omissions, particularly for provision of media in alternative formats. This article will also provide recommendations for accessibility informed by this study and by Activity Theory.

#### Introduction

The use of online resources for university programmes is well established in the United Kingdom. The use of digital resources is one of the Herts Learning Principles – *Harnesses Technology* (University of Hertfordshire, 2023). Canvas, a virtual learning environment (VLE), is used at the University of Hertfordshire to deliver blended educational programmes. The Herts Learning Principles set out in the principle regarding *Harnesses Technology* that 'Pedagogy, inclusivity, and accessibility determine the use of technology to support engagement in learning, teaching and assessment' (University of Hertfordshire, 2023).

Within the Equality Act 2010, discrimination on the basis of disability is unlawful. Universities must ensure that their educational programmes are accessible for disabled learners and must make reasonable adjustments to ensure that disabled learners can study. Additionally, the Public Sector Bodies (Websites and Mobile Applications) (No. 2) Accessibility Regulations 2018 (UK Government, 2023) embed the obligation on public sector bodies – including universities – to ensure the accessibility of their online content using recognised standards.

Online accessibility has been defined as "removing barriers to participation and engagement in the online experiences and the degree to which someone can access an online resource regardless of their disability, technology or environment" (Seale, 2008, p29). Accessibility for disabled learners is required by legislation, but also should be considered in light of other factors. Disabled learners are a substantial proportion of university students. The Office for Students (2023) reported that 18% of students in 2021-22 reported having a disability.

The present author is engaged in teaching and assessment for the BSc (Hons) Occupational Therapy degree apprenticeship programme at the University of Hertfordshire and creates content for the programme's Canvas site. This course is delivered by blended learning. This paper will critically consider the extent of digital accessibility of the online learning resources for a module within this course and theory relating to accessible e-learning. The paper will explain the rationale and methods for how this was determined, report the findings, and critically appraise these in relation to the literature with consideration of recommendations for any future changes that are needed for accessibility for the course.

#### Literature Review

Occupational therapy is a health and social care profession that focuses on enabling people to engage in occupations, which are defined as activities that people want or need to do (Royal College of Occupational Therapists, 2023a). The option of degree apprenticeship, which combines workplace learning and university study, is a recent development in preregistration occupational therapy education in England (Royal College of Occupational Therapy, 2023b). According to the most recent diversity monitoring data from the Health and Care Professions Council (2021), 11% of occupational therapist survey respondents reported being disabled. However, Bevan (2014) highlighted from an ethnographic study that disabled occupational therapists reported barriers and discrimination in their preregistration education, which did not improve upon entering practice.

The social model of disability (Oliver, 2013) has been established by disabled people as a model which identifies that the difficulties, challenges, and discrimination faced by disabled people is due to the various barriers – physical, attitudinal and institutional – created by society which deny participation. This contrasts with the medical model of disability which holds that the limitations on participation in society by disabled people are directly due to medical conditions.

Use of online learning can vary from courses which are delivered entirely online to those with a blended format. The use of online learning was identified by Lumsden et al (2020) as being most appropriate when (a) the intended learning is knowledge that could be didactically provided to students and (b) when students can test their knowledge by using online tests. Lumsden et al (2020) viewed this approach as being supported by the use of Bloom's taxonomy with lower orders of cognitive domain being utilised. However, the effect of the societal restrictions prompted by the COVID-19 pandemic in 2020 resulted in a rapid transition to online learning within occupational therapy higher education (Brown et al, 2022), with blended approaches remaining for many programmes including that of the present author.

# Web accessibility

The Web Content Accessibility Guidelines (WCAG) (Web Accessibility Initiative, 2023a) are the global standards for online accessibility of websites. The principles of WCAG are intended to apply to those who develop websites, including content. The principles of web accessibility according to WCAG are for websites and content to be:

- Perceivable by all users
- Operable for interfaces and navigation
- Understandable both the content and system to access the content
- Robust content must be interpretable by a wide range of technologies.

(Web Accessibility Initiative, 2023a)

Many applications have accessibility features already built in, such as text readers for PDF documents at current standards. Some learners may use assistive technologies to access learning resources, where specialist equipment is used to access digital technology (Heiman et al, 2020). However, many learners may use mainstream technology as these have been designed with features to be accessible to a wide range of users.

The most recent standard for accessibility is WCAG 2.2. (Web Accessibility Initiative, 2023b). The Public Sector Bodies (Websites and Mobile Applications) (No. 2) Accessibility Regulations 2018 define accessibility as compliance with this standard by October 2024 (UK Government, 2023). Practitioners in higher education need competencies to ensure that the learning materials provided on VLEs that they produce are accessible to learners with a wide range of abilities (Seale, 2008).

# **Theoretical approaches**

With regards to digital learning, some authors have considered how learners participate in online learning. Redmond et al (2018) described a framework of online engagement in learning which had five domains. This framework was devised using a social constructionist approach combined with thematic analysis, based on a review of the literature. There are five domains in the framework and Redmond et al (2018) propose that all five need application for effective engagement by learners in online learning. These domains are:

- Social engagement (learners participate in online communities)
- Cognitive engagement (understanding ideas and concepts)
- Behavioural engagement (active participation in accordance with rules)
- Collaborative engagement (developing networks, and beyond the university)

• Emotional engagement (how students feel about their learning)

This framework provides several evidence-based approaches for facilitating online engagement, however the framework by Redmond et al (2018) has no mention of accessibility, engagement by disabled learners, or inclusion, which seem to be substantial omissions from this framework given that approximately one-fifth of university students report a disability.

Seale (2007) raised the possibility of using Activity Theory as a framework to develop accessible e-learning resources. Activity Theory considers the relationship between the subject (person) and objects, in a conceptual space where the social conditions shape learning. Activity theory has its roots within constructivism. It originated from the work of Leontn'ev and Vygotsky (Seale, 2008) and was further developed by Engeström within Cultural-Historical Activity Theory (as described by Roth (2004) and Seale (2008)).

Roth (2004) discussed activity theory in relation to education and viewed that Activity Theory could be applied to how people can change, how education can change, and how society can change. There are six main elements within Activity Theory (Cole and Engeström (1993) cited by Roth (2004)); subject, object, tools, rules, community, and division of labour. This has been represented as a triangle which indicates the relationships between the elements:



From Roth (2004), p3 (Figure 2).

Within this perspective on education, the student participates in learning, mediated by rules, and becoming part of a community. The participation in learning requires tools (learning resources, writing tools) and generates outcomes (e.g., passing the course).

Seale (2007) considered Activity Theory in relation to accessible e-learning and concluded that "accessible e-learning activity will not develop until tools, rules, roles and responsibilities are developed that all the relevant communities can apply comfortably and consistently" (Seale, 2007), as educators need to consider issues beyond the 'tools'

(computer systems) and to consider the wider context, such as the systems that educators work in and the diverse stakeholders involved in education.

The relationships between components in this approach are mediated. "Tools mediate the relationship between subject and object, the relationship between subject and community is mediated by rules, whilst division of labour mediates the relationship between object and community." (Seale, 2008, p163). Burghstahler et al (2020) highlighted that although legislation exists that require that educational institutions provide accessible learning resources, the focus has been on compliance with regulations, which does not ensure inclusiveness of learning.

# Online accessibility: not solely web applications

Wider accessibility issues which are beyond the scope of WCAG include the importance of accessing lecture recordings online, which has been found in research to aid the learning of students with ADHD (Attention Deficit Hyperactivity Disorder) (Levenberg et al, 2023) and dyslexia (Nightingale et al, 2019), as well as widening participation by enabling learners to recap on key points to aid their learning and participate despite various challenges to their engagement in face-to-face lectures (Mackay et al, 2021).

The advance publishing of lecture slides and materials for class sessions is required for many learners, and there are some guidelines from universities about this (University College London, 2017). However, the evidence for this initially appears limited. Worthington and Levasseur (2015) and Leon and Martinez (2021) found that advance publication of slides decreased academic performance. However, it should be noted that these studies did not consider issues of accessibility in learning, such as the effects of advance PowerPoint slide provision for learners with dyslexia or ADHD.

Learners at the University of Hertfordshire use Canvas for summative assessments, in particular for submitting written coursework which is marked and graded through Canvas. The use of e-assessment is considered by Rolim and Isaias (2018) as being widespread and valued by teachers and learners, however issues of accessibility are not noted in their study.

# **Research** question

The research question for this paper is: How accessible are the online learning resources on Canvas for a pre-registration occupational therapy degree apprenticeship?

# Methodology

A quantitative approach was used within this study to determine the extent of accessible content for a module taught at the University of Hertfordshire. The study used existing data within the Canvas system.

#### Ethics

The study is within the scope of UPR RE01 Appendix 1 Version 12.0 *Protocol for Reflective Practitioner Work by Academic Staff* (University of Hertfordshire, 2021), being for enhancement of the curriculum and using existing anonymised data on teaching and assessment resources and their usage. Therefore, approval by an Ethics Committee was not required for this study.

# Data collection and analysis

The present author is a member of the teaching team on the BSc (Hons) Occupational Therapy degree apprenticeship. The scope of a full accessibility audit on the BSc Occupational Therapy degree apprenticeship Canvas content is beyond the competency of the present author, who has not had formal training in auditing web accessibility. A structured framework for accessibility checks is available from the Web Accessibility Initiative (2023c); the Web Content Accessibility Guidelines Easy Checks (WCAG-EC). However, these checks refer to extensive checks of webpage structure using Internet Explorer, which is obsolete and has been superseded by Microsoft Edge.

Canvas has some accessibility checks built in when webpage content is authored or edited. Canvas is reported to be "substantially compliant" by the producer, Instructure (2023a), with level A and AA of WCAG 2.1 (Web Accessibility Initiative, 2023d), having been externally audited (by charity WebAIM) and reported by means of a Voluntary Product Accessibility Template (Instructure, 2022), with accessibility of much content being the responsibility of the educator. The accessibility checker in the Rich Content Editor of Canvas automatically indicates in edit mode if there are any accessibility issues with content provided by educators and checks for multiple issues as detailed by Instructure (2023b) (see Appendix A). This was selected for completing checks to make best use of resources, as manual checks using WCAG-EC would be time-consuming and Canvas being deemed compliant with WCAG 2.1.

The content that has been reviewed is for the module Professional Values and Ethics 4HSK0094-0105-2022 (iteration for Semester B, 2022-23), which is a compulsory 15 credit module at Level 4. The summative assessment is professional discussion; however the learner does not upload any materials for marking. 26 apprentices were registered. The present author is module leader for this module and this accessibility review has been completed with full awareness of the Programme Leader.

The following methodology was devised by the present author:

• Report downloaded from New Analytics of weekly online activity for CSV file Resources, which indicates anonymised web page usage data for the module including page name, total number of students who accessed, and total number of views per page.

- CSV file converted to Excel spreadsheet.
- Each module page was accessed using Microsoft Edge and reviewed manually using edit mode, checking if any accessibility issues were automatically identified and noting what these were.
  - Any module pages in the report that could not be located or checked for accessibility using the systems in Canvas were noted.
  - Resource types were noted.
- Manually checking page content to ascertain if there were:
  - Images with alt text, and if so, noting what the alt text description was and if it was meaningful.
  - Resources for session, the file type, and if relating to a taught session if it was uploaded 24 hours in advance. (This was confirmed by viewing Page History.)
  - A recording, and if there were captions or a transcript.
- Compiling these results into an Excel spreadsheet.
- Compiling descriptive statistics on the number of pages with accessibility issues.

Full results are available at Appendix B.

#### Results

For the module Professional Values and Ethics 4HSK0094-0105-2022 a resources report was run on 19<sup>th</sup> December 2023 and content checked on 23 December 2023.

This report indicated there were 170 pages within the module, of which 6 could not be located from educator access and for 71 pages an accessibility check could not be run from Rich Content Editor. This was for pages which were a direct file upload or integral to Canvas structure (e.g., pages for Grades, Zoom). A total of 93 pages were assessed for accessibility using the above methodology.

# Occurrence of educator created pages with accessibility issues

The majority of educator created module pages (82 pages, 88.2% of module pages) did not have automatically detected accessibility issues. However, 11.8% of module pages (11 pages) had unresolved detected accessibility issues. seven pages had one issue, three pages had two issues, and one page had eight issues. There were issues with description of table contents lacking a caption (3 pages), image filenames being used as alt text attribute (3 pages), heading description (3 pages), list formatting (1 page). These pages with issues included those accessed by the majority of the learners including the summative assessment

schedule, formative assessment information and images of Padlets (which were accessed by all learners). (Table 1)

Module page	Total number of students who viewed page	Total page views	Number of issues detected by accessibility check tool
Course Home	26	2845	1
Professional Discussion	26	357	0
Summative Assessment Schedule for 15th March	26	274	2
Formative Assessment Information	26	238	2
Debate Information	26	204	2
Question selection for summative assessment	25	195	0
Formative assessment 1st March - case studies	26	186	0
Case Scenarios for Summative Assessment 15th March 2023	26	171	0
Slides for Values session	26	169	0

**Table 1:** Summary of 10 Most Frequently Viewed Pages and Accessibility Issues

There were a total of 4 images within the module pages and none of these had meaningful alt text descriptions. Alt text descriptions included "Social Worker 2 – Values and ethics", and "PVE padlet unit 2 workplace.png".

# Session resources uploaded in advance

The expectation for the programme is that resources used in teaching sessions are uploaded at least 24 hours in advance. There were 26 pages with resources for teaching sessions, of which 38.5% (10 pages) had resources uploaded less than 24 hours in advance.

### Recordings and availability of multimedia alternatives

There was a total of 16 edited pages with a recordings (15 video recordings, 1 audio recording). None of these had transcripts or audio description. Of these, 10 were recordings of teaching sessions with a total of 244 page views. The median number of students accessing each session recording was 17 (range of 4 to 21 students accessing each page with recording), indicating that these recordings were being used by many in the cohort.

A total of 4 recordings had automatically generated captions (25% of recordings), the remainder (75% of recordings) had no captions at all.

### Discussion

This study of the accessibility of the online content for Professional Values and Ethics indicated that the majority of module pages (88.2%) had no accessibility issues which were detected by the accessibility checker in Canvas, and therefore potentially meeting the standards for WCAG 2.1. The module analytics report for Resources demonstrated that session recordings were accessed by learners, reflecting the value that learners place on having access to these (Nordmann, 2023). Most session materials were uploaded according to established timescales within the department.

There are several areas for further development of the author's practice. Images did not have meaningful alt text, rendering them meaningless for learners using screen readers. Recordings had inconsistent application of captions, and none had a transcript, which does not comply with WCAG 2.1. This omission would affect access to materials by learners with hearing impairment and the use of captions and transcripts has been noted to be helpful to all learners (Nordmann, 2023). Resources were often not uploaded in a timely manner before sessions, which could affect engagement in the session by learners with dyslexia (University College London, 2017). Several accessibility issues (total: 21) were detected by the Canvas accessibility checker in edit mode but remained unresolved at the time of the study. The checker provides prompts to resolve the accessibility issues to the educator, however these had not been acted upon.

There are several limitations with the study. The present author has not had formal training on accessibility of online learning, or about assessing online accessibility. The present author found limitations of the existing easy check audit tools and therefore developed their own criteria for assessing accessibility issues with the content on Canvas. This was not developed in co-production with other stakeholders; however stakeholder engagement has been identified as important for online accessibility (Seale, 2008).

The study was of one module site; therefore the generalisability of findings is limited across other modules or programmes. The present author evaluated their own work. This might give rise to issues of integrity of the author to honestly evaluate their own work. However, Canvas keeps track of edits made to module content, so this would be independently auditable if necessary. Additionally, the present author is empowered to make changes directly from recommendations of this study.

## Recommendations

The present author intends to make the following changes to their own practice when developing module materials within Canvas and learning materials:

- Ensure meaningful alt text is provided for all images, including within PowerPoint slides.
- Ensure all recordings have auto-generated captions as a minimum.
- All accessibility issues identified by automated checker are resolved.
- Upload session resources in a timely manner, at least 24 hours before session.
- Report findings and recommendations of this study to programme leader.

Activity Theory has been identified as an approach that can enable accessibility of e-learning (Seale, 2008), however there seems to be an absence of published evidence to support this. Research could evaluate changes in e-learning accessibility guided by the application of Activity Theory to understand how useful Activity Theory is for accessible educational practice.

For the present author's school, the following is recommended. The present author suggests that school accessibility guidelines are developed with stakeholders (in line with recommendations of Seale, 2008), including educational technologists and students, to ensure that online learning is consistently accessible. To ensure accountability, auditable standards should be developed in co-production with stakeholders, and audits completed to confirm how the standards are being met. Finally, the viability of using the application Ally (Blackboard, 2023) at the University of Hertfordshire should be evaluated. Ally can be used with Canvas; it can detect accessibility issues across modules and provide alternative formats for content. These recommendations link to application of Activity Theory in practice (Seale, 2008), by using tools that enable accessibility, developing and applying rules for practice, and considering division of labour.

There is further scope to consider the factors that enable engagement in online learning by occupational therapy apprentices. Brown et al (2021) noted the importance of collaborative and active engagement for occupational therapy students when learning was transferred online due to the COVID-19 pandemic, which reflects elements of the online engagement framework of Redmond et al (2018), for example facilitating online interaction with peers and teachers. There should be consideration of how active engagement in collaborative online learning can be facilitated for all learners.

There is limited published literature about occupational therapy degree apprenticeships, which link work-based learning with academic study. Liddell et al (2023) noted several themes for successful learning from occupational therapy apprentices, who valued the opportunity to apply learning in the workplace in daily practice and the support from colleagues. The availability of pre-session learning materials was considered very important by participants. Bevan (2014) noted that participants in her study of experiences of disabled occupational therapists found that negative attitudes of colleagues and educators were the greatest barriers, rather than those of the environment (in the widest sense) or organisation. There is scope for educators in occupational therapy to consider ensuring that accessible online learning resources are made a priority.

### Conclusion

This study reviewed the accessibility of online learning resources for a module within a degree apprenticeship programme in occupational therapy and found that although many resources had accessibility considerations according to standards (WCAG 2.1) and evidence, many resources did not, particularly in relation to alternative media formats and unresolved content accessibility issues. Several recommendations were made by the present author for their own practice and for enhancing online accessibility at the University of Hertfordshire. Activity Theory is noted as a theory of practice that could be applied to enhance accessibility of e-learning and ensure inclusion of all learners (Seale, 2008). Lecture recording and advance provision of lecture resources via online platforms should be considered as accessibility issues.

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- The Rich Content Editor includes an accessibility tool that detects common accessibility errors within the editor. You can use the Accessibility Checker to design course content while considering accessibility attributes. This tool only verifies content created within the Rich Content Editor. You may use other accessibility tools to verify additional content in Canvas.
- All accessibility components retain the parameters set by your institution's Theme Editor template. The Accessibility Checker verifies the following accessibility rules:
- Adjacent links: Adjacent links with the same URL should be a single link. This rule verifies link errors where the link text may include spaces and break the link into multiple links.
- Heading paragraphs: Headings should not contain more than 120 characters.
- Image alt text: Images should include an alt attribute describing the image content.
- Image alt filename: Image filenames should not be used as the alt attribute describing the image content. Currently, files uploaded directly to Canvas create a redirect that does not properly verify image filenames.
- Image alt length: Alt attribute text is recommended to contain fewer than 120 characters.
- Large text contrast: Text larger than 18pt (or bold 14pt) should display a minimum contrast ratio of 3:1.
- Lists: Lists should be formatted as lists.
- Sequential headings: Heading levels should not be skipped (e.g. H2 to H4).
- However, the tool does not check if the first header starts with H2 or whether the headings are sequential with the rest of the content in the page. Tables do not begin with H1, which is designated for the page title.
- Small text contrast: Text smaller than 18pt (or bold 14pt) should display a minimum contrast ratio of 4.5:1.
- Table captions: Tables should include a caption describing the contents of the table.
- Table header scope: Table headers should specify scope and the appropriate structure.
- Table header: Tables should include at least one header.

Appendix B: Data from accessibility checks on 4HSK0094-0105-2022 (completed on 23/12/2023)

Page	Total numbe of student: whp viewed page	i Total number dof page views	How many accessibility check issues?	What accessibility	Any images?	Do images have alt text? (Y/N)	Is alt text meaningful? (Y/N)	Does the page refer to resources ?	What were resources?	Were the session resources uploaded at least 24 hours before session?	Does the page have a recording?	Is the recording a teaching session?	Does the recording have captions?	COMMENTS
Course Home	26	2845	1	The first heading on a page should be an H2.	Y	Y	N	Ν	N/A	N/A	Ν	N/A	N/A	
Course Modules	26	2334	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM
Professional Discussion	26	357	0	N/A	N	N/A	N/A	Ν	N/A	N/A	N	N/A	N/A	Summative assignment page
Zoom	26	335	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM
Course Announcements	26	334	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM
Summative Assessment Schedule for 15th March	26	274	2	Tables should include a caption describing the contents of the table. Tables	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	

				should include a least one header.										
Course Assignments	25	264	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM
Formative Assessment Information	26	238	2	Tables should include a captior describing the contents of the table. Tables should include a least one header.		N/A	N/A	N	N/A	N/A	N	N/A	N/A	

Course Grades	26	210	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM
Debate Information	26	204	2	Tables should include a caption describing the contents of the table. Tables should include at least one header.	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
Question selection for summative assessment	25	195	0	N/A	N	N/A	N/A	Y	recording	N/A	Y	N	N	recording no captions
Formative assessment 1st March - case studies	26	186	0	N/A	N	N/A	N/A	Y	Word document	Y	N	N/A	N/A	

Case Scenarios for Summative Assessment 15th March 2023	26	171	0	N/A	N	N/A	N/A	Y	PDF	Ŷ	N	N/A	N/A	Case scenarios for summative assessment
Slides for Values session	26	169	0	N/A	N	N/A	N/A	Y	Powerpoint	Y	N	N/A	N/A	
Pre session activity	25	154	0	N/A	N	N/A	N/A	у	Powerpoint	у	N	N/A	N/A	
Consent and Capacity Lecture Slides and Case Studies	25	140	0	N/A	N	N/A	N/A	у	Word document; powerpoint	у	N	N/A	N/A	
Unit 6 - Slides for Clinical Governance session	22	139	0	N/A	N	N/A	N/A	Y	Powerpoint	Ŷ	N	N/A	N/A	
Week 31 Reflect on the messages for collaborative working emerging from the audiovisual materialsdocx	19	134	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
4HSK0094-0105-2022 summative assessment case studies for Canvas (1).pdf	25	132	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
IPE Week 30 Case studies for students pt 1.docx	24	130	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
IPE values (1).pptx	20	130	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
Feedback from the formative assessment session	25	128	0	N/A	N	N/A	N/A	Y	PDF	N/A	N	N/A	N/A	

Assessment Guidelines	26	121	0	N/A	N	N/A	N/A	Y	Word document	N/A	N	N/A	N/A	
IPE Week 20 Group working presentation SV.pptx	20	121	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM
IPE - Videos of other professionals to watch	24	120	0	N/A	N	N/A	N/A	Ŷ	video	Y	Y	N	N	
Slides for session about confidentiality and record keeping	22	120	0	N/A	N	N/A	N/A	Y	Powerpoint	Y	N	N/A	N/A	
IPE - Unconscious bias	24	119	0	N/A	N	N/A	N/A	у	Powerpoint; audio file	Ν	y	N	у	audio file has no captions
Group SWOT Analysis	23	117	0	N/A	N	N/A	N/A	Y	Word document	Y	N	N/A	N/A	
Case scenarios- cultural considerations	23	117	1	Lists should be formatted as lists.	N	N/A	N/A	Y	Word document	N	N	N/A	N/A	

Communication theory from IPE sessions	26	116	0	N/A	N	N/A	N/A	у	word ; powerpoint	N	N	N/A	N/A	Slides were uploaded on day in error
Reading for Unit 2	23	115	0	N/A	N	N/A	N/A	Y	Reading reference	Ŷ	N	N/A	N/A	
IPE - asynchronous session	21	107	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	

Unit 5 - GDPR slides	25	103	0	N/A	N	N/A	N/A	y	Powerpoint	N	N	N/A	N/A	File was updated on day of session
Introduction to assessment - slides	21	100	0	N/A	N	N/A	N/A	Ŷ	Powerpoint	N	N	N/A	N/A	09.01 day before
Slides for the compassion session	23	99	0	N/A	N	N/A	N/A	Y	Powerpoint	Y	N	N/A	N/A	
Unit 1 - Values Updated for 2023 .pptx	26	97												can't locate the page
IPE Values presentation	21	97	0	N/A	N	N/A	N/A	Y	Powerpoint	Y	N	N/A	N/A	
Ethical Examples	24	96	0	N/A	N	N/A	N/A	Y	Powerpoint	N	N	N/A	N/A	
IPE Week 30 Case studies for students pt 2.docx	22	95	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
Course Discussions	23	93	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
IPE risk assessment form.docx	20	92	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
Introduction to Unit 4	22	90	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
Useful links for case scenarios-2	23	87	0	N/A	N	N/A	N/A	Y	Webpages	Y	N	N/A	N/A	

Formative Assessment Case Studies 2023.docx	25	86	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM
														FROM EDUCATOR SIDE
Case scenarios for GDPR	25	86	0	N/A	N	N/A	N/A	у	webpage	N	N	N/A	N/A	
Timetable	21	83	0	N/A	Ν	N/A	N/A	Y	Word document	N/A	N	N/A	N/A	
Interprofessional education formative assessment - groups 1 to 6 submit your reflection here	19	82	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
Unit 3 Post-session reading	18	82	0	N/A	N	N/A	N/A	Y	webpages	N/A	Ν	N/A	N/A	
Post session activity - create a values poster	20	81	0	N/A	N	N/A	N/A	N	N/A	N/A	Ν	N/A	N/A	Instructions for post session activity but no adjustments for visual impairment
Professional Discussion - Refer	17	80	0	N/A	N	N/A	N/A	Ν	N/A	N/A	N	N/A	N/A	
IPE Week 30 Case studies for students full.pdf	17	78	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM
NHS Values - Group padlett	20	77	1	Image filenames should not be used as the alt attribute describing the image content.	Ŷ	Y	N	N	N/A	N/A	N	N/A	N/A	

Assessment	Guidelines	4HSK0094-0105-2022	final 22	2	76	N/A	UNABLE TO CONFIRM										
version.docx																	FROM EDUCATOR SIDE

Introduction to Unit 7	17	76	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
IPE Week 28 Group Working Activity 1.docx	21	74	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
Introduction to Unit 2-2	23	73	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
feedback from formative assessment 1st March 2023-1.pdf	23	73	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
Padlett for IPE discussion	18	73												can't locate the page
Week 20 Instructions for group working activity.docx	15	73	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM FROM EDUCATOR SIDE						
Case scenario discussions	20	72	0	N/A	N	N/A	N/A	Y	Powerpoint	N	N	N/A	N/A	11.54 day before
Week 20-Ground rules for group work- template.docx	18	72	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM FROM EDUCATOR SIDE						
Additional reading	15	71	0	N/A	Ν	N/A	N/A	Y	webpage	N/A	N	N/A	N/A	

Padlet for cultural considerations from workplace	24	67	1	Image filenames should not be used as the alt attribute describing the image content.	Y	Y	Ν	N	N/A	N/A	N	N/A	N/A	Padlet accessibility issues
4HSK0094 Professional Values and Ethics timetable 2023.docx	17	66	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM
Introduction to the assessment - recorded presentation	16	66	0	N/A	N	N/A	N/A	Y	recording	N/A	Y	N	N	
IPE Week 30 Risk Management - full slides	15	65	0	N/A	N	N/A	N/A	Y	powerpoint	N/A	N	N/A	N/A	
IPE values presentation (1).pptx	20	64	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM
Introduction to Unit 5	21	62	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
Introduction to Unit 1	19	62	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
IPE session 1	18	60	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
Unit 6 - Clinical Governance 2023.pptx	21	59	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM FROM EDUCATOR SIDE
Week 20 Reflection on collaborative working in week 20.docx	( 16	58	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM

Unit 3 - Capacity and Consent 2023.pptx	22	57	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
														FROM EDUCATOR SIDE
Worksheets 3 and 4 for IPE	20	57	0	N/A	N	0	N	Y	Word document	Ν	N	N/A	N/A	Uploaded in session due to error

IPE Risk Management - slides for session	17	57	0	N/A	Ν	N/A	N/A	Y	Powerpoint	Y	N	N/A	N/A	
IPE 4 Wk 28 Group work activity 2 15 minutes.docx	12	55	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
Code of Conduct for Professional Discussion	20	54	0	N/A	N	N/A	N/A	Y	PDF	N/A	N	N/A	N/A	
NHS Values padlett.png	18	53	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
Unit 5 GDPR 2023 - updated.pptx	21	51	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
The cognitive skills of compassionate team management - updated - 2023.pptx	21	47	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						

NHS and Social Care Values and British Values	18	47	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
Unit 3 Confidentiality and record keeping 2023.pptx	19	46	N/A	UNABLE TO CONFIRM										
Introduction to Unit 6	18	44	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
4HSK0094-0105-2022 Professional Values and Ethics	16	44	N/A	UNABLE TO CONFIRM										
Unconscious Bias 2021.pptx	19	42	N/A	UNABLE TO CONFIRM										
Values posters	18	40	0	N/A	N	N/A	N/A	Y	PDF	N/A	N	N/A	N/A	
Wk 29 IPE Communication 2022-23 Student version.pptx	17	39	N/A	UNABLE TO CONFIRM										
Wk 31 SWOT analysis (002).docx	19	38	N/A	UNABLE TO CONFIRM										
Ethical Examples Student Version.pptx	20	36	N/A	UNABLE TO CONFIRM										
Introduction to Unit 3	18	36	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
Formative assessment 01/3/23 group allocation published	18	35	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	announcement

Safeguarding	17	34	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
Padlett Discussion Board	16	34												can't locate the page
Reflection sheet for IPE	13	34	0	N/A	N	N/A	N/A	Y	Word document	N	N	N/A	N/A	Uploaded in session due to error
Apprenticeship standards and Maths / English skills-2	15	32	1	The first heading on a page should be an H2.	N	N/A	N/A	Y	PDF	N/A	N	N/A	N/A	
Unit 4 recording	11	32	0	N/A	N	N/A	N/A	Y	recording	N/A	Y	Y	N	
PVE padlet unit 2 workplace.png	18	31	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM FROM EDUCATOR SIDE

Module Specific Requirements	14	31	8	Tables should include a	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
				caption describing the										
				contents of the table.;										
				Tables should include at										
				least one header.; Tables										
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				one header										
				one neuden.										
Course People	13	31	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM
														FROM EDUCATOR SIDE
Graduate Attributes 2022/23	15	30	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
Recording of Unit 5 session	10	30	0	N/A	N	N/A	N/A	Y	recording	N/A	Y	Y	N	
	10	20												
IPE 14th December recording	10	29	0	N/A	N	N/A	N/A	Ŷ	recording	N/A	Y	Y	Y	auto generated
														captions
Code of Conduct for OT Professional Discussion Assessments	15	28	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM
final.pdf														
														FROM EDUCATOR SIDE
Introduction to the module Professional Values and Ethics	14	28	0	N/A	N	N/A	N/A	Y	Powerpoint	Y	Y	N	N	
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Recording of Unit 1 session	13	28	0	N/A	N	N/A	N/A	Y	recording	N/A	Y	Y	N	audio recording, unclear why audio for teaching session
Unit 3 recording	11	28	0	N/A	N	N/A	N/A	Y	recording	N/A	Y	Y	N	content warning
Formative assessment 01/3/23 additional update	18	27	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
Unit 5 - post session reading	12	27	0	N/A	N	N/A	N/A	Y	webpage	N/A	N	N/A	N/A	
Recording of Jeremy Evans values session	10	26	0	N/A	N	N/A	N/A	Y	recording	N/A	Y	Y	N	
Week 29 Task 4 Dangers of Commonality and Difference-	16	25	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
Summative assessment 15th March - schedule has been published	18	24	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	announcement
Week 29 Task 3-Barriers to communication-1.docx	15	24	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
4HSK0094 Assessment Introduction - 2023.pptx	13	24	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						

Week 30 Interprofessional Practice Risk student copy - 2023	12	24	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
Unit 6 - recording of session	12	23	0	N/A	N	N/A	N/A	Y	recording	N/A	Y	Y	N	
Professional Discussion Feedback on group SWOT analysis	6	23	0	N/A	N	N	N/A	Y	recording	N/A	Y	N	N	no audio captions
Recording of Unit 2	14	22	0	N/A	N	N/A	N/A	N	N/A	N/A	Y	Y	N	
Now published - Case scenarios for summative assessment and code of conduct for professional discussion	14	22	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
Unit 1 - 18th January	11	22												can't locate the page
Week 29 Task 1-Communication changes over time.docx	10	22	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
Wednesday 14th December - Interprofessional Education 9- 11	15	21	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM FROM EDUCATOR SIDE						
Professional Values and Ethics - formative assessment on campus - 1st March	14	21	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	announcement
Professional Values and Ethics Summative Assessments - grades posted	12	21	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
Feedback from formative assessment	15	20	0	N/A	Ν	N/A	N/A	Y	PDF	N/A	N	N/A	N/A	

Introduction to the module and some pre-session activities	12	20	0	N/A	N	N/A	N/A	Y	canvas page	N/A	N	N/A	N/A	
Useful links for case scenarios	10	20	0	N/A	N	N/A	N/A	Y	weblinks	Y	N	N/A	N/A	
Clarification regarding announcement 'Professional Discussion - Refer'	12	18	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	announcement
IPE - feedback on SWOT analysis about Interprofessional Working	11	18	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	announcement
Case Studies for Consent and Capacity Lecture.docx	10	18	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
Unit 2 case scenarios for Canvas.pptx	12	17	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
mentimeter_qr_code.png	10	17	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
Mid-module feedback-2	9	17	0	N/A	N	N/A	N/A	Y	weblink to menti	N/A	N	N/A	N/A	
4HSK0094 Assessment Introduction - 2023 updated.pptx	12	16	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
Interprofessional Education - 1st March	11	16	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	announcement

Unit 2 - 25 January	12	15	0	N/A	Ν	N/A	N/A	Ν	N/A	N/A	N	N/A	N/A	
Unit 8 Debate	12	15												can't locate the page
IPE Unit 4 Recording	10	15	0	N/A	N	N/A	N/A	Y	recording	N/A	Y	Y	Y	auto generated captions
Week 29 Task 2-Communication with others.docx	9	15	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						

Padlet for feedback on case scenarios	11	14	1	Image filenames should not be used as the alt attribute describing the image content.	Y	Y	N	N	N/A	N/A	Ν	N/A	N/A	
PVE padlet unit 2 case scenarios.png	11	14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM
Week 30 Interprofessional Practice Risk full - 2023 (2).pptx	9	14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM
Graduate Attributes	8	14	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
Course Collaborations	7	14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM

Microsoft O365 LTI	7	14	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
														FROM EDUCATOR SIDE
This morning's IPE session	13	13	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
Case Studies Unit 2 Culture - Jan 2023 - no reveal (1).docx	9	11	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
Week 29 Reflection on the skills communication.docx	5	11	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
IPE 15th February recording	4	11	0	N/A	N	N/A	N/A	Y	recording	N/A	Y	Y	Y	auto generated captions
Values Posters Group 2.pdf	9	9	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM FROM EDUCATOR SIDE						
Values Posters Group 1.pdf	9	9	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
Invitation to complete Student Voice Questionnaire (SVQ)	7	8	0	N/A	N	N/A	N/A	N	N/A	N/A	N	N/A	N/A	
Course Pages	4	8	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						
Unit 5 GDPR 2023.pptx	4	7	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM						

Mid-module feedback actions	6	6	0	N/A	N	N/A	N/A	Y	PDF	N/A	N	N	N	
Week 29 Task 4 Dangers of Comm and Diff ANSWERS-1.docx	2	6	N/A	UNABLE TO CONFIRM										
4HSK0094 Introduction to the module - 2023.pptx	5	5	N/A	UNABLE TO CONFIRM										
Chat	5	5	N/A	UNABLE TO CONFIRM										
Unit 1 - Values Updated for 2023 -1.pptx	3	4	N/A	UNABLE TO CONFIRM										
Professional discussion - refer summative assessment information	2	3	0	N/A	N	N/A	N/A	Y	PDF	N/A	N	N/A	N/A	
Course Files	2	2	N/A	UNABLE TO CONFIRM										

| 4HSK0094-0105-2022 summative assessment case scenarios<br>for Canvas - refer.pdf | 2 | 2 | N/A | UNABLE TO CONFIRM                       |
|--|---|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|
| Reading List   | 1 | 2 | N/A | UNABLE TO CONFIRM<br>FROM EDUCATOR SIDE |

Professional discussion - refer summative assessment case scenarios	2	2	0	N/A	N	N/A	N/A	Y	PDF	N/A	N	N/A	N/A	
Mid-module feedback - Professional Values and Ethics and Inter-Professional Education 23 Feb 2023.pdf	1	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM
Safeguarding-2	1	1												can't locate the page
redacted (tutor name)	1	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM
redacted (student name)	1	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM
redacted (tutor name)	1	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM FROM EDUCATOR SIDE
Code of Conduct for OT Professional Discussion Assessments final (1).pdf	1	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	UNABLE TO CONFIRM
Apprenticeship standards and Maths / English skills	1	1	1	The first heading on a page should be an H2.	N	N/A	N/A	Y	PDF	N/A	N	N/A	N/A	

# Anatomy learning experiences of physiotherapy undergraduate students in the BSc Physiotherapy programme.

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#### Abstract

The acquisition of knowledge in human anatomy is a fundamental prerequisite for physiotherapists. However, there is a dearth of understanding regarding the experiences and perspectives of undergraduate physiotherapy students in relation to the learning of anatomy. This study aimed to explore the students' experience of learning anatomy in Year One of the Physiotherapy undergraduate programme, using the Anatomy Learning Experiences Questionnaire (ALEQ), adapted for Physiotherapy students. Twenty-two responses were garnered, resulting in a 30% response rate. The students expressed positive perceptions of several learning activities, including using images, online quizzes, and the Internet. However, there was a prevalent opinion that the sheer volume of content to be learned was daunting. Notably, they recognised the significance of anatomy in the context of future clinical practice. In year one of the Physiotherapy programme, Anatomy education might benefit from changes to current teaching and learning practices to facilitate students' anatomy learning.

#### Introduction

The study of human anatomy is considered an integral element in worldwide healthcare and medical-related discipline curricula, as it provides the understanding of body structures and functions at an organisational level (Arráez-Aybar et al., 2010). Physiotherapy undergraduate training programmes in the UK also have a significant amount of anatomy learning embedded in their curricula to equip their students for safe and effective future clinical practice (Bithell, 2000). A comprehensive knowledge and understanding of anatomy also provides the scientific basis for differential diagnosis and clinical decision-making, leading to high clinical competency in patient management (Lai et al., 2020; Siiayah et al., 2019). In addition to the scope of the undergraduate programmes, some postgraduate programmes and extended-scope practice networks recognised by the Chartered Society of Physiotherapists (CSP) may require their member physiotherapists to achieve a greater depth of Anatomy (CSP-Scope, 2022). However, while identified as the most important basic science in medical and healthcare education, anatomy is also recognised as one of the most challenging subjects to study in basic sciences largely due to the voluminous contents and complexity in terminology (Pabst and Rothkötter, 1997; Terrel, 2006).

Physiotherapy undergraduates at the University of Hertfordshire also learn Human Anatomy during multiple speciality modules during their first and second years. A majority of the content of the anatomy is embedded within musculoskeletal, cardiorespiratory and neuroscience 1 and 2 modules in their year one and year two, respectively. Each module's

summative assessments in year one assesses students' anatomy knowledge more explicitly using a viva station as one of the three stations in their Objective Structured Clinical Examination (OSCE). Two of these year one modules are 15-credit modules (cardiorespiratory one and neuroscience 1), while the other (musculoskeletal 1) is a 30credit module.

Consistently, over the past years, across all three modules, the highest percentage of failed students have been reported in the viva station that assesses their anatomy knowledge in each speciality module. Moreover, the number of students who have failed this viva station is almost twice the number of the other two stations of the OSCE. For example, in the academic year 22/23, in the Musculoskeletal 1 module assessment's first attempt, 22 out of 66 students failed their first station, which was the viva station. In comparison, only 10 and 12 students failed stations two and three, respectively. Twenty-six students had failed at least one station and 10 out of that 26 had failed only one station, anatomy viva station. A similar pattern of marks distribution was consistent with the other two speciality modules and has also been observed over the years. It was evident that Year One students were struggling with their anatomy learning and performing in their assessments despite the anatomy learning support they received during teaching and learning sessions in their Year One modules. This overall performance representation corroborates with some existing studies that identify anatomy learning as a challenge among medical and healthcare degree programmes (Cuschieri and Narnaware, 2023; Strkalj et al., 2011; Terrel, 2006).

#### Literature Review

There is a significant body of literature looking at different curricular and pedagogical principles used in anatomy teaching to facilitate teaching and learning anatomy to physiotherapy undergraduates (Gangata and Vigurs, 2023; Shead et al., 2020). In their systematic scoping review looking at pedagogical aspects of anatomy education, Shead et al. (2020) discuss the use of several successful approaches, including inter-profession education (IPE), computer-assisted learning (CAL), team-based learning (TBL), flipped classroom approach and the use of cadavers and dissections. Meanwhile, in a recent study conducted in the UK by Gangata and Vigurs (2023), they propose the use of a new modified version of cognitive load theory (CLT) and recommend using a spiral curriculum approach (Bruner, 1960) across the three years of the physiotherapy curriculum to introduce explicit anatomy teaching during the later clinical years. It is argued that novice learners with limited long-term memory capacities might benefit from regular revisitation and kinesthetic input relevant to their learning because of the fragile nature of the newly acquired knowledge.

According to Cuschieri and Narnaware (2023), interactive approaches such as gamification and quizzes are proven to positively affect knowledge retention and the anatomy learning experience among physiotherapy undergraduates. Active learning strategies, such as problem-based learning, case-based learning, and peer teaching, are often incorporated into anatomy teaching and learning within medical education. These strategies engage students in collaborative activities, critical thinking tasks, and hands-on experiences to deepen their understanding of anatomical concepts (Garrison et al., 2017). The literature also recognises the benefits of incorporating technology, such as virtual dissection tools and online resources, to enhance anatomy teaching (Cheng et al., 2018). These tools provide additional resources for self-directed learning and visualization of complex anatomical structures (Drake et al., 2014). The shift towards student-centred learning approaches, where students actively participate in their education, is evident in anatomy teaching literature (Drake et al., 2009). This approach promotes self-directed learning and critical thinking skills.

However, while understanding these pedagogical aspects and recent recommendations, it is also crucial to investigate the student perspective of teaching and learning anatomy. However, there appears to be a paucity of literature investigating students' experiences towards learning anatomy and to date, there are no studies conducted in the UK to explore physiotherapy students' anatomy learning experience. Therefore, the main aim of this study was to explore the students' experience of learning anatomy, including facilitators and challenges to learning anatomy in year one of the physiotherapy undergraduate programme.

#### Methods

# Study design and setting

A cross-sectional study design was employed using an online survey with a mixed-method questionnaire to collect responses from physiotherapy undergraduates studying for the Bachelor of Physiotherapy degree at the University of Hertfordshire. Students enrolled in the academic year 2022/23 for their Year One studies of the programme were recruited for the study. This group of students were most suitable as opposed to current Year One students who have just started their speciality modules and anatomy learning. Online surveys are identified as a less time-consuming, convenient, and cost-saving method of data collection, whilst also being proven to be effective in measuring attitudes (Aiman-Smith and Markham, 2004; Mertler, 2002). Furthermore, during a part of the data collection period, students of this year's group were on their clinical placements. An online survey was the most appropriate method of reaching more students.

# Data collection tools

Responses were collected using an online survey designed using the modified anatomy learning experiences questionnaire (ALEQ), which has been validated in medical students to investigate the perceptions of paramedicine students towards learning anatomy. ALEQ was first designed by Smith and Mathias (2010) as a tool to explore preferred learning activities and resources, working with cadaveric specimens, challenges in learning anatomy, and the application and perceived relevance of anatomy to clinical contexts. ALEQ has been

validated for its psychometric properties in a study with medical students, concluding it is a psychometrically robust tool (Choi-Lundberg et al., 2017). Data were collected using an online survey comprising demographic data, the modified ALEQ and a section of open-ended questions. The use of open-ended questions enabled participants to express and articulate opinions or simply ones that had been overlooked by the researcher when creating the survey, thus providing rich and relevant data (Albudaiwi, 2017).

The original 38-item ALEQ developed by Smith and Mathias (2010) was modified according to the context of this study. This contained 27 items grouped only into four clusters which included: (1) your learning (preferred learning activities and resources); (2) learning problems (challenges in learning anatomy); (3) using anatomy (applying anatomical knowledge in clinical and other contexts); (4) overall perceptions of anatomy (relevance of anatomy to physiotherapy practice). Working with cadavers cluster and final year-specific cluster originally included in the ALEQ by Smith and Mathias (2010) were excluded from this modified version due to irrelevance. A 5-point Likert scale ranging from strongly disagree to strongly agree, including the option of agree nor disagree, was included as the response option for all questions. A modified questionnaire was piloted using a sample of four Year 2 undergraduates from a different healthcare degree programme. Following the pilot study, some minor amendments were made to 2 questions in cluster 1 and 2 questions in cluster 4.

# Sampling and Data Collection

The sample was selected using the convenience sampling method. All data were collected online using a survey hosted by Online Surveys (Onlinesurveys, 2023), a General Data Protection Regulation (GDPR) compliant cloud-based software (previously known as Bristol Online Survey -BOS). Participation in the study was voluntary and anonymous. An announcement was posted on the BSc Physiotherapy canvas page inviting all year two students to take part in the study with the link for the online survey. The first page of the survey included the participant information sheet, which directed students to complete the consent form if they were willing to participate in the study. The second page was the econsent form, followed by the demographic questions of the questionnaire, ALEQ, and a section of open-ended questions. An email reminder, including the survey link, was also sent weekly for four weeks to increase participation in the data collection.

#### Results

Twenty-two questionnaires were received from 71 potential Year 2 physiotherapy undergraduate students, resulting in a response rate of 30%. Out of 22, 16 were female and 6 were male students. Average age of the respondents was 19.3 years. The main findings of the ALEQ are summarised in the following sub-sections according to each cluster of questions. Results were analysed using Microsoft Excel and SPSS 28. In order to clearly indicate to the reader, the positive and negative perceptions of each item response, the results of the 5-point Likert scale were reduced to three possible outcomes: Agree - including students who have indicated they agree or strongly agree; Neutral- including students who neither agree nor disagree, Disagree- including students who have indicated they disagree or strongly disagree. Key results from ALEQ responses are summarised in the next sections as percentages for each questionnaire item in each cluster.

# Learning activities and resources

Eight items explored students' perceptions of their preferred learning and resources (Figure 1). All students (100%) agreed that using images was an effective way of studying anatomy. The second highest level of agreement score (86%) was recorded for the use of online quizzes, followed by the use of the Internet (82%). The lowest level of agreement was recorded for reading textbooks (36%). Only 40% had used the anatomy learning support learning materials provided in modules. Eleven students listed their answers in response to an additional open question regarding resources and activities that helped most with their anatomy learning. These included the use of bone boxes, online quizzes, the anatomy lab visit, taking turns with other students to describe a specific anatomy learning, revision sessions and explaining to each other, practical sessions, online videos, summary notes on Canvas, Anatomy TV and Powerpoint presentations uploaded onto Canvas.



# Figure 1: Student perception of anatomy learning activities and resources

# **Challenges in Learning Anatomy**

Nine questions explored students' challenges in learning anatomy (Table 1). The majority (68%, n = 35) found the amount of learning daunting. Of the sample, a majority (73%) disagreed having problems learning anatomy because they did not see it as relevant. Also, a

majority (68%) agreed they struggled to build their anatomy knowledge as they often forgot what they learned in the previous sessions. Furthermore, 59% of the respondents believed learning anatomy was difficult because it was memorisation-based. A similar percentage of students agreed that they understood the depth of the knowledge expected from them in Year 1 assessments. Six students responded to the additional open question about other challenges they faced during anatomy learning. In their responses, three students named specific topics of anatomy they struggled with, including muscles, nerves, and neuroanatomy. The other three responses highlighted the difficulty of focusing on anatomy topics at a time when other multiple topics and subject content are being taught at the same time (e.g., I would have preferred an intensive anatomy week or semester then apply that knowledge to assessment, treatment and pathologies.).

Statement	Agree (%)	Neutral (%)	Disagree (%)
The amount of anatomy I needed to learn was daunting	68	14	18
The anatomy resources for teaching within the programme are limited	27	50	23
I had problems learning anatomy because I didn't see its relevance	18	9	73
I had problems learning anatomy because the teaching styles did not suit me	41	32	27
Examinations did not reflect my understanding of anatomy	50	23	27
My main motivation for learning anatomy was to pass exams	46	40	14
Learning anatomy was difficult because it is memorisation-based	59	23	18
I struggled to build on my anatomy knowledge as I often forgot what I learned last week/month/semester	68	14	18
I understood the depth of the anatomy knowledge examiners expected me to know in year 1 assessments	59	18	23

Table 1: Student perception of challenges in learning anatomy

# Application of anatomy knowledge in clinical and other contexts

Five questions in this cluster studied students' perceptions of the application of their anatomy learning (Table 2). Of respondents, 82% agreed they used their anatomy knowledge frequently whilst on placements. Also, a slightly smaller majority agreed that they use their anatomy terms and language at every opportunity (77%) and their anatomy learning informs learning in other areas of the programme (64%).

Statement	Agree (%)	Neutral (%)	Disagree (%)
The organisation of the physiotherapy programme allows me to quickly put anatomy knowledge into use	50	46	4
I have problems using my knowledge of anatomy because I am not confident with my knowledge base.	54	23	23
My anatomy learning informs learning in other areas of the course.	64	32	4
I use anatomical terms and language at every opportunity (eg, home/uni/clinical).	77	23	0
I use my anatomy knowledge frequently while on placement.	82	18	0

Table 2: Student perception on the application of anatomy knowledge

#### Relevance

In the last cluster, more than 80% agreement was achieved in both questions, exploring students' viewpoints on the relevance of anatomy learning (Figure 2). Eighty-two per cent agreed that their opinion of the relevance of anatomy has increased as the course progressed, and 86% agree upon the importance of understanding anatomy as a physiotherapist.



# Figure 2: Student perception of the relevance of anatomy learning

In addition to the above questionnaire items, students were asked for suggestions to help with their anatomy learning. Only three students responded to these questions, and their responses suggested the use of more online quizzes, having rapid-fire type in-class quizzes, increased use of bones and anatomical models during teaching sessions, and introducing summarised sections of information within anatomy lessons.

# Discussion

This study aimed to understand physiotherapy students' anatomy learning experience and to identify facilitators and challenges associated with anatomy learning. Anatomy is crucial in health education and is integral to a physiotherapist's professional clinical practice. Despite being identified as a daunting task and a challenging area of teaching and learning (Cuschier and Narnaware, 2023; Terrel, 2006), to date, there are no studies conducted in the UK to explore physiotherapy students' anatomy learning experience. Also, reflecting on student performances in their year one summative assessment, it is imperative to discover potential changes that can be introduced to the teaching and learning strategies to facilitate and improve these students' anatomy learning experience and outcomes. The findings from the study provide valuable insights into the perceptions of physiotherapy undergraduate students towards learning anatomy, focusing on preferred learning activities, challenges faced, application of knowledge, and the relevance of anatomy to physiotherapy practice. The discussion will explore these results in the context of pedagogy and theories of anatomy teaching and learning.

Notably, 100% of the respondents agreed that using images was an effective way of studying anatomy, emphasising the importance of visual aids in anatomy education. The high agreement on the effectiveness of using images and online quizzes aligns with the principles of visual learning and active engagement in education (Mayer, 2008). Visual aids, such as images, enhance understanding and retention of anatomical information (Gurpinar et al., 2011). The preference for online quizzes reflects a shift towards digital and interactive learning methods, consistent with the principles of constructivism, where learners actively engage with content to construct their understanding (Jonassen, 1999). According to

Carnicelli et al. (2022), paramedic undergraduate students have also reported similar preferences in online quizzes and the Internet, with levels of agreement of 80% and 88%, respectively. About 63% of respondents in their study found reading could be an effective way of learning anatomy, in contrast to the lowest agreement rate (36%) noted in this study. The open-ended responses highlighted various resources students found helpful, including bone boxes, anatomy lab visits, online quizzes, and collaborative learning sessions including group tasks and practical sessions. One respondent had suggested rapid in-class quizzes to help with anatomy learning. This could be easily implemented and has proven to be an effective technique to improve student performance in anatomy (Poljicanin et al., 2009).

The challenges identified, such as the daunting amount of content and difficulties in relevance perception and memorisation, are consistent with the cognitive load theory (Sweller, 1988). Anatomy education often involves a high cognitive load due to the volume of information, and students may face challenges in processing, organising, and retaining this information. The call for an intensive anatomy week or semester suggests a desire for focused, immersive learning experiences aligning with experiential learning theories (Kolb, 1984).

The positive response regarding applying anatomy knowledge during placements supports the principles of situated learning (Lave & Wenger, 1991). Learning is most effective when it occurs in authentic contexts, and the findings suggest that the physiotherapy program provides opportunities for students to apply theoretical anatomical knowledge in real-world clinical settings.

The high agreement on the increasing perception of relevance over the course duration is consistent with the principles of andragogy, where adult learners are motivated when they perceive the content as relevant to their goals (Knowles, 1984). Additionally, the acknowledgement of the importance of understanding anatomy aligns with the foundational role of anatomy in the education and practice of physiotherapy.

# **Pedagogical implications**

While results suggest that students exhibit diverse preferences for learning activities and resources, they indicate the popularity of digital learning tools, suggesting a shift towards more interactive and technology-driven learning methods. Also, results suggest the need for diverse teaching strategies that incorporate visual aids, interactive tools, and real-world applications to enhance engagement and understanding. Cuschieri and Narnaware (2023) have demonstrated that Kahoot! Game-based quiz platform enhances the learning experience and improves short-term retention of anatomy knowledge in physiotherapy students. Given the suggestion of this study's results to use quizzes more frequently and broadly to facilitate anatomy learning, it would be useful to consider adopting such techniques within anatomy teaching.

Moreover, the results of this study supported some existing teaching strategies in the programme, such as anatomy lab visits and the use of bone and muscle models in class, which can enhance experiential learning and address challenges related to relevance and memorisation. The use of cadavers, bone models, and muscle specimens in anatomy learning for physiotherapy students is strongly supported by evidence and provides a multifaceted and dynamic approach to education (Drake et al., 2014; Estai & Bunt, 2016).

Furthermore, results highlight the importance of being mindful of the cognitive load associated with anatomy learning and consider strategies to scaffold information, such as chunking content and providing effective study resources. Numerous studies have investigated various pedagogical approaches to teaching anatomy, but a definitive body of evidence supporting a single best approach remains elusive. Gangata and Vigrus (2023) recommend an overarching spiral curriculum to reduce the overloading of anatomy learning in the first year. Authors argue that typical anatomical teaching suffers from being too modularised, while the principle of the spiral curriculum extends beyond the responsibilities of a single speciality or module. This involves sequencing information over three years according to complexity to ease the pressure of working memory and revisiting the knowledge to minimise the decay of temporary knowledge (Merriënboer & Kester, 2014).

# Limitations

The study's reliance on convenience sampling and the limited sample size may impact the generalisability of the findings. Future research could explore more extensive and more diverse samples to ensure a broader representation of physiotherapy students. Also, it should be noted that this study only explored perceptions of one year group of the programme. Additionally, qualitative research methods like interviews could provide deeper insights into students' experiences and perceptions.

#### Conclusion

Consistent with previous literature, physiotherapy students found that the amount of anatomy to learn was daunting, and they struggled with the long-term retention of what they studied in anatomy. However, this did not negatively impact students' perception of its relevance or importance to becoming a physiotherapist. Some teaching activities and resources were preferred by students over others, which included the use of images, online quizzes, and the Internet. Moreover, anatomy education in year one of the physiotherapy programme might benefit from changes to current teaching and learning practices to facilitate students' anatomy learning.

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# Filling the Soft-Skills Development Gap: a focus on teamworking

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#### Abstract

Supply Chain and Manufacturing Management, a one-year Masters course run by the School of Physics, Engineering and Computer Science (SPECS) at the University of Hertfordshire, does not presently include formal development of so called 'soft skills', such as communications, collaboration and teamworking; yet these are essential skills for students wishing a career in Supply Chain Management (SCM), logistics and manufacturing management roles. Furthermore, an increasing emphasis is being placed on summative assessments of group-based, teamworking, student assignments. Action to rectify the gap in the curriculum is being considered within the SPECS. This paper proposes an activity-based teaching and learning experience for the development of teamworking skills, the design of which is grounded in the pedagogy relating to activity based, experiential and compassionate learning. It is recommended, however, that further research take place to measure the success of the strategy based on, ex post, student grades and future employability.

#### Introduction

It has long been recognised that Teamworking skills is a valuable life and work skill to possess, not least for students. Riebe, L., et al. (2016), having reviewed a considerable body of literature on the subject, concluded that teamwork and associated communication and collaboration skills, have moved from a desirable skill in the workplace to an essential requirement. This statement has been supported by various employer groups, from the CBI in the UK, the Australian Industry Group and Deloitte, 2009, among others. Teamworking also improves performance and outputs: Wilson, L., et al. (2018) refer to the impact on a person's mental well-being and their level of confidence in social and workplace environments; Francis, N., et al. (2022), imply that more learning happens within team activities than any other form of teaching within Higher Education (HE) and grades achieved are frequently higher for students' group work than for their individual assessments. The power of team activities in the learning process is supported by other research, implying students learn by working "with, and through, others in a team...lending excitement to the learning experience" (Devasagayam, R. et al. (2012), pp2-3).

An increasing number of group-work assignments are being considered for Supply Chain and manufacturing management modules designed for students of the Engineering department in the School of Physics, Engineering and Computer Science (SPECS) at the University of Hertfordshire. Within the discipline of engineering itself, teamwork and collaboration, both intra- and inter-organisational, are incorporated into the instructional, teaching content of the subject. For example, concurrent engineering, product design and production,

intrinsically necessitates teamworking and multi-disciplinary collaboration within and between companies. Similarly, Supply Chain Management (SCM) increasingly requires new strategies and business models which embrace collaboration at their core. For example, the collapse of many supply chains during the Covid-19 pandemic, 2020-2022, revealed the disconnect between producers, suppliers, and retailers: Operating under traditional business models, they were unable to work together in a coordinated, agile and reactive manner which the situation necessitated. Additionally, internationally agreed targets and deadlines on Greenhouse Gas (GHG) emissions places considerable responsibilities on industry to reduce theirs to zero by 2050 for their entire supply chains and all the parties involved in their supply chains; this can only be achieved with far closer collaboration than has previously existed. Collaboration-models now form a body of strategic thinking in Supply Chain Management.

It might be surprising, therefore, that within the SPECS, there are currently no modules teaching and developing at undergraduate or postgraduate levels, teamworking and collaboration skills. However, it appears that this is not an isolated gap in HE teaching: employers have commented for many years that science graduates more generally, lack communication skills and knowledge of collaboration or teamworking practice (Wilson, L., et al 2018).

The SPECS is currently seeking to address this gap in its curriculum. A new module is foreseen for Level 7, one-year Masters students in Supply Chain Management and Manufacturing, around the teaching and development of so-called "Soft Skills", including teamworking.

This article seeks to examine further, the arguments which supports the closing of this teaching and learning gap. It draws on a wide range of pedagogic sources covering different HE disciplines, and around the Dewey theory of experiential learning, incorporation of compassionate learning and activity-based learning. The paper proposes an appropriate design for a teamworking skills development course within a wider module covering so called 'soft' management skills development. Specifically, activities have been designed to deliver understanding of the benefits and strengths of teamworking, the different roles and associated behavioural traits of people fulfilling those roles, and how one can build, manage, and lead a team to achieve success in SCM and manufacturing-related scenarios. Students will be allowed to practice what it is like to work in a team. Students will be better prepared for their given group-activity assignments within their continuing studies toward a Manufacturing and Supply Chain Management Masters qualification.

#### Data Gathering: Literature

The research was divided into three distinct areas of work (Stage 1-3), followed by the drawing together of the literature into a learning and teaching proposal (Stage 4).



Figure 4: Outline of research stages (source: author)

Literature relating to these four stages (Figure 4) was critically reviewed by means of a thematic analysis methodology, focussing specifically upon the following themes:

- Significance of teamworking skills to employers (Stage 1)
- Value of teamworking skills as a learning outcome for students (Stage 2)
- Theory to practice: teamwork skills-development teaching methods and approaches (Stage 3)

# Significance of teamworking skills to employers

There exists a whole body of research which recognises how teamworking skills has become essential to employers (Wheatley, 1992) (Wilson, L., et al., 2018). Wilson et al. (2018) even suggests that from an analysis of research spanning between 2000 and 2017, science graduates, in particular, lack generic transferable skills in communication and collaboration. There are some extremely well-recognised and well-used models for the management of employees by businesses around the world, which boast better teamwork, performance, and business results. The Belbin® model is one of the best known in business management circles. This came to the fore in the late 1980s and through the 1990s. At its core is the principle that "everyone can make a valuable contribution at work, so long as they are able to identify and use their strengths in a team setting." (Source: https://www.belbin.com/about).

The strengths of an individual and the roles people would naturally play in a team, are identified through completion of an on-line "Self-Perception Inventory" questionnaire; these roles fall into nine categories. The theory suggests that the ideal team dynamics arise when all nine characteristics are present. A similar and popular strengths identifier can be found with the Clifton Strengths<sup>®11</sup> assessment; the principle here is similar to Belbin<sup>®</sup>, in that "people and organizations grow more when they focus on what they do best rather

<sup>11</sup> Formerly known as the Clifton StrengthsFinder<sup>®</sup>.

than trying to fix their weaknesses" (Louis, M. C., 2012). It presents thirty-four characteristics divided into four 'domains': Executing, Influencing, Relationship Building and Strategic Thinking.

The Myers Briggs<sup>®</sup> represents a further widely used personality assessment which categorizes individuals into sixteen personality types based on four dichotomies: Extraversion/Introversion, Sensing/Intuition, Thinking/Feeling, and Judging/Perceiving. While not specifically designed for team roles, it can offer insights into communication styles and likely business-relationships with colleagues.

Combined, these three models alone have been used by many thousands of companies in the management and development of their employees, worldwide.

# Value of teamworking skills as a learning outcome for students

Smith, M., et al. (2012) cited work by Gibbs and Dunbar-Goddett (2007), who suggested that introducing students to group-work without any introduction to the skills required, or to an 'unbalanced' team dynamic (i.e., not having the nine Belbin® team characteristics present) could lead to anxiety and disorientation for the students. As indicated previously, Francis, N., et al. (2022) believe students will learn more in group work-based teaching and achieve higher grades; they indicate skills learnt include being able to collaborate, listen and give feedback, be more creative, building on existing ideas, time management and becoming more reflective. Devasagayam, R., et al. (2012) also point to building information literacy among students when groups discuss and analyse what information they have found that could be valuable in any group task they have been assigned.

Unpublished student feedback given directly to SPECS teaching staff and through other SPECS feedback mechanisms, reveals some students, especially among international students, dislike written examinations and prefer other forms of summative assessment. The SPECS teaching staff are responding to this feedback by introducing into modules experiential learning (as exemplified by Conley, W.J., 2008 in a sports teaching context) through assessed group-based activities. It would have been helpful in this research if the student feedback had been more 'scientifically' collected and appropriately published. Nevertheless, it seems intuitive from the literature that a learning gap within the curriculum does exist and that, if filled, it would better prepare students for group-based assignments and assessment.

# Theory to practice: teamwork skills-development teaching methods and approaches

As mentioned, the SPECS has already determined a need to explore the introduction of teamwork skills teaching and learning. There is plenty of literature to draw upon, providing the pedagogy to choose which underpins the design of the teaching and learning framework. Given the evidence that employers would welcome it, and students would enhance their learning from it, an experiential learning approach would seem appropriate to

adopt. Drawing further on the literature, group-activities would yield a more enjoyable learning experience with better attainment levels than a purely classroom delivered teaching experience (Devasagayam, R., et al., 2012).

Learning in stages has been recognised in the pedagogy as helping students by leading them through "the cave of ignorance" and on to the experience of enlightenment (Gibbs, 2017). Therefore, one can divide the teaching into a number of separate but linked activities, creating a pyramidal learning experience, and "engaging the student in a process of sense-making." (Mayer, R. 1998: 368 in Watkins, C., et al. 2007, pp72-73).

The intended learning outputs should be:

- To know how roles and responsibilities can be assigned within a team
- To manage team projects and tasks using a systematic methodology (a 'generative' learning activity) a mental framework providing order and control over a project's conduct (Fiorella and Mayer (2015)
- To be an effective team member, and to lead a team if and when required
- To realise the performance-related benefits from effective teambuilding and management

The assessment of the activities completed will be formative; summative assessments are only made on coursework assignments and examinations upon completion of each module. It should be remembered that the intention here is to prepare the students for such summative assessments of their group-based assignments.

Elements of compassionate learning and teaching pedagogy should be applied to the Activity design, majoring on inclusivity (Gibson, S. and Cook-Sather, A., 2020), regardless of gender, culture (DE, A.K.W. et al.,2020), language skills, and background educational or working experiences of students. Development of relationships within teams is an important and key feature of any experiential learning activity (Bower, G. 2014) and for successful teams (Belbin, R.M. 2012), and this would also be something the Activity would try to foster.

The Activity should incorporate multiple techniques and media to deliver key information and insights, which would increase the potential for student learning (Skrypnyk et al., 2015).

The models of team building, personality and behavioural assessment used or referenced would equally be as broad as possible: care has to be taken as to the selection of such models to insure against any breach of copyright and trademark infringements that the most popular models strictly guard themselves against.

The design of the activity should include a **preliminary introduction** which contextualises the value to them of the proceeding activities, and therefore helps stimulate greater

engagement (Osika, A., et al. 2022). In particular, the relevance of teaching teamworking can be put in the context of future employability. Also introduced would be the value of teamworking for successful project planning and management. This would be followed by three sequential proposed group-activities.

# Group Activity 1

As already stated, compassionate learning and teaching should be a feature in the Activity design. Forcing students to sit alongside and work with those whom they may be unfamiliar, may create anxieties and deter early engagement. No attempt at this initial stage in the Activity should, therefore, be made to manage the composition of groups. Groups of three or four would be appropriate, formed where the students voluntarily place themselves at the start of the lecture; as such they are likely to have seated themselves among those with whom they are already familiar. This fact alone, may aid group discussion. The Activity will not be formally assessed; therefore, it will not matter if some groups present higher levels of ability than others: all groups will be contributing equally to a wider class discussion and sharing insights. Furthermore, nobody is left-out or last to be picked by a group, which avoids potential anxiety or embarrassment, feelings that have been recognised to significantly impede a student's learning (Francis, N., Thomas, J., Allen, M., 2022; Clark, A. et al., 2022).

Communication is easier among all participants with such small group sizes, and still allows a reasonable probability for a wider range of skills or knowledge to be held within the groups; though some form of individual student marginalisation may be possible if two or more get on better with each other (Francis, N., Thomas, J., Allen, M., 2022).

Aligning with good practice, basic rules of team etiquette should be displayed for all to see and adhere to (Jackson, 2014). Such might include:

- taking turns to speak and not interrupting others
- showing respect for the right of others to express views and beliefs different from one's own
- challenging ideas not individuals
- encouraging participants to explain why they hold particular views
- and making sure everyone can take part

The students will be introduced to different self-assessment tools, such as the BelbinTM nine team roles, the Myers-Briggs<sup>®</sup> sixteen personality types, and CliftonStrengths<sup>®</sup> thirty-four identifiable types. Students in their groups will attempt to characterise themselves using a colour chart designed to reflect their characteristics and personalities based on an

amalgam of the different models for building balanced teams, accredited appropriately to their respective sources. Combining group discussions within a wider class discussion, a broad understanding should emerge around the full range of team roles and responsibilities, practices and behaviours most likely needed for a team to function effectively. Licences to use one or each of the models for students to gain an assessment of themselves, would be more ideal; however, given the number of students typically enrolling in the programme and registering for such a module, the cost to the University or School, may be prohibitive.

Having self-selected a colour, which denotes a particular personal characteristic with likely personal behavioural traits, and what team roles they might suggest they naturally could lean towards, their choices will be discussed within their groups. Again, by being in small groups but potentially among people with whom they are already familiar, this should be informal and light-hearted. Academic staff managing the activity, will move between the groups to ensure group etiquette is being followed.

# Group Activity 2:

Aligned with the intended learning outcomes, students should recognise how different people of different characteristics and roles work together. Now it is time to test the theory with practice. As an authentic learning experience, comparable to real-world work situations, teams work on tasks and projects, to agreed goals and objectives; however, first they need to have a common understanding of best practice in objective-setting and project or task planning which will be explained.

New groups will be formed based upon the character-traits of the students: Each group (ideally of six students per group) will contain at least one of the four colours12 in order to try and manage some degree of team balance. This is important: according to the different team-building models, team performance will be impacted by team-composition. Some people will inherently work well with those displaying compatible characteristics and behaviours, whilst others might clash. Having a team with a broad mix of characteristics aids cooperation and collaboration (Smith, M., et al. 2012). Groups of six is deemed to be arguably an ideal size for small tasks and projects (Francis, N., Thomas, J., Allen, M., 2022): it allows for a sub-division of roles and a group leadership to evolve. However, there is a risk of so-called 'passenger behaviour', whereby a team member does not contribute much to the group but leaves others do all the work. Groups of seven or more are to be avoided

<sup>&</sup>lt;sup>12</sup> This prevents groups from naturally being formed by acquaintances or friends and creating groups that might comprise people of higher ability than others which could influence the range of grades achieved among the groups (Francis,N., Thomas, J., Allen, M., 2022). It also mimics the real-world where teams are determined by project or line managers rather than by the team participants themselves.

except for large tasks, because of the greater risk of unequal participation, passengerbehaviour, more dominant members overwhelming any shy group members.

Every team should identify who, according to the coloured stickers and their relationship with specific characteristics as previously explained, will assume the following roles:

- team leader
- scribe for the whiteboard (recording the points, issues and conclusions of the group discussions)
- An observer (to take notes on how people performed their roles assess and if their behaviours matched well with their self-assigned role)13
- A timekeeper (to ensure progress is made and the group concludes the activity within the time allotted)
- General project team members (the observer, scribe and timekeeper should not be excluded from contributing to discussions)

Each group will be equipped with necessary tools to progress, such as a whiteboard and whiteboard marker pens, whiteboard cleaner, coloured sticky-notelets, pens and paper.

On completion of a set task which itself will relate to a SCM and manufacturing management context, adding to the authentic learning experience, all the groups will rejoin and a nominated representative of each will report back what they managed to deliver.

For the purposes of measuring the effectiveness of the learning and how students feel about the process, a short feedback survey will be completed by each student. Given the survey is aimed at developing and improving teaching and learning, it should be considered compatible with the ethical approval policy detailed in the University Policies and Regulations (University of Hertfordshire) document RE01.

The survey should be designed to return answers which reveal the following insights:

- How each student believed the group had performed
- Whether the teams had a balanced composition or not
- Whether the team composition (balanced or unbalanced) correlated with overall team performance

<sup>&</sup>lt;sup>13</sup> It is suggested that observers distribute points on a two-part checklist split between positive and negative traits; if a phrase describes the person's behaviour in the team, then it can be ticked or even double-ticked (Smith, M., et al 2012).

- Whether the prior-teaching and learning of teamworking theory and practice helped
- Other observations they might wish to make.

The survey should be relatively quick to complete but requires some important time for reflection on the part of the students. For efficiency and maximising the reply rate, an online format for the survey would enable quick aggregated and anonymised analysis. The tool of choice being considered is Microsoft Forms.

Results will be aggregated and anonymised, providing a representation of the most common to least common personal attributes identified within the groups and a correlation analysis between team composition and personal feelings expressed about the performance of the team.

The results of the survey could be compared in the class setting with observations made by each of the 'observers' in each group. To ensure an informal and inclusive environment is maintained, discussions will be held in the so-called "World Café<sup>TM</sup>" format<sup>14</sup>.

# Group Activity 3:

Groups will remain the same, unless the academic staff managing the activities deem it necessary to alter the balance of certain groups due to insurmountable issues of conflict between two or more students within a group. Team roles of individuals can be changed if members of the group agree to such changes.

A further authentic task will be given to all groups.

As with Group Activity 2, a feedback survey will be repeated and, along with 'observer' feedback, compared with the results and analysis of the previous feedback. It might be anticipated that overall, performance and personal experiences of the group activity should improve as learning and practice increases. A class discussion of the results would conclude the students' learning experience.

#### **Conclusions and Discussion**

It seems logical to conclude from the literature that a gap does exist within the present curriculum, not preparing students adequately for their group-based assignments used for summative assessments on completion of each module and course. The proposal made herein, would seek to fill this gap, and improve student learning and raise their grades as a result; and it would provide skills relevant to the world of work, thereby increasing their

<sup>14</sup> For further information see <u>https://theworldcafe.com/key-concepts-resources/world-cafe-method/</u>

attractiveness to potential employers. Nevertheless, it would be prudent to conduct further research to prove such successes.

It would also be of value to gather feedback in a more formal data collection process to monitor student attitudes towards group-based assignments in place of, or alongside, formal exams. The results and analysis could be presented as an update to this research article.

This article has not considered the effects of neurodiversity, cultural or ethnic diversity on survey responses or teamworking and team performance. These remain issues that could also be examined more closely and, in particular, when reviewing the success or otherwise of the teamworking Activities.

Given the current make-up of international students, this article and much of the research on teamworking itself, also fails to examine or ask questions relating to the impacts on students that have English as an Additional Language (EAL), working within groups that have English as a first language. The notion of creating multi-lingual groups, perhaps using a hybrid form of English, which Madondo, F., 2023, terms as *'translanguaging'*, might also be introduced into the module, and within the associated Activity design, and thereby contributing to the de-colonisation of HE.

Whilst all the activities are envisaged to sit within a broader module around soft skills teaching and learning, it is worth considering in due course, how this might be constructed in practice: care should be taken to construct the modules in a manner that builds an appropriate learning scaffold. A wider evaluation may be required, to ensure a module framework is created that is consistent with the pedagogy around learning; such would include allowing students time to make sense of the information and experiences being exposed to them, and building towards a point where they can apply this knowledge to new contexts (Watkins, C., et al. 2007).

In conclusion, the success of this proposal for activity-based teaching and learning of teamworking skills, will only be fully understood when several student cohorts have participated and completed their studies, and their results have been analysed and compared with the average grades prior to its introduction.

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# Tackling challenges faced by older students in Social Work Training: does age matter?

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#### Abstract

While classrooms often marked by diversity in terms of ability, ethnicity, and cultures, the unique context of social work training introduces an additional layer of diversity – age, particularly, with a significant proportion of students over 30 years old. Therefore, this paper addresses the challenges of teaching and learning for older students, aiming to propose an approach that enhance their learning experience and learning outcomes. This study reviews existing literature, using a systematic approach to literature search and data analysis, to obtain understanding of how adult intelligence development intertwines with the learning process. It reveals that, to optimize outcomes for students of varying ages, universities must first acknowledge the impact of age, formal education and intelligence on students' learning ability, thereby influencing the overall learning experience and performance. Furthermore, it advocates for the integration of adult intelligence theories, particularly the most crucial model of fluid intelligence and crystalised intelligence (Cattel, 1963; Horn, 1971; and Carol 1993), into the design and implementation of approaches suitable for students of diverse age, particularly for older students, to empower them to achieve academic outcomes on par with their younger counterparts. Ultimately, this paper aims to contribute to the advancement of pedagogical approaches that foster practices of inclusivity, accessibility, blended and personalised learning which are core to Herts Learning Principles.

#### Introduction

In the contemporary landscape of Higher Education (HE), students exhibit a marked diversity, particularly in terms of age, alongside other dimensions such as culture, ethnicity, and educational levels. This is because of the government's widening participation agenda since 2003 which requires that equal opportunities to HE should be given to students from a wide variety of ages, backgrounds, culture, and abilities (Vuolo, 2010). For example, social work students whose ages span from 18 to over 50 (Social Work Education in England, 2023). Notably, a substantial proportion of social worker students or qualifying nursing students are mature learners (Vuolo, 2010), including many over 30s, adding a distinctive layer to the academic milieu.

# Mature students and older students

Mature students, as defined by UCAS, refer to those who are 'over 21 years of age at the beginning of their undergraduate, or over 25 years of age at the beginning of their postgraduate studies' and statically, 40% of them are over 30 (UCAS, 2023). They often

balance their studies alongside work, caring responsibilities, or other commitments. Notably, a substantial proportion of mature students have to take Access to HE diplomacourses due to having few or no previous qualifications, or many may enrol based on their work or life experience (UCAS, 2023). This is also a typical admission route of mature social work students. According to an analysis of Higher Education Statistics Agency (HESA) in 2023, 36% of students enrolled in undergraduate social work courses are aged 30 and above, significantly higher than the 16% recorded across all undergraduate courses (Skills For Care, 2023). This study uses "older students" to refer to those who are aged 30 and above.

# Age-related challenges for older students

Adult development constitutes a multifaceted and complex process, combining natural aging progression, an adaptational responses to the experience of the life course, and a construct of multiple personal and social factors (Hoare, 2008). This encompasses the cultivation of knowledge, understanding, skills, attitudes, interests, and appreciation. Unlike the linear trajectory often associated with childhood development, adult development is a nuanced interplay of various factors, reflecting individual response to life complexities. Despite the richness of this journey, literature suggests a prevailing notion that aging may be linked to a decline in learning abilities (Blum et al., 2017; Kliegel & Altgassen, 2006).

#### Intelligence theories, age & older adults' learning ability

Cognitive development theory pioneered by Jean Piaget in the early to mid-twentieth century mainly for children, suggests several stages of cognitive development. More recently adult cognitive development theories have emerged to explain how constructed knowledge and experience during adulthood contribute to ongoing cognitive development. Notably, pioneering work of Cattell (1963) and Horn (1971) have profoundly shaped discussions on intelligence development, introducing the crucial concepts of fluid intelligence (Gf) and crystallized intelligence (Gc). Gf, reliant on the central nervous system, enables pattern recognition, abstract reasoning, maths skills and swift responses (Cattell 1966 in Merriam & Bierema, 2014, p.177). Gf allows individual to solve new cognitive problems that requires attention and short-term memory, independent of earlier learning experiences. On the other hand, Gc is shaped by life and educational experiences, referring to the ability to solve familiar problems. This capability is developed and honed through the accumulation of knowledge and experiences over the lifespan, incorporating broad cultural knowledge and specific sources such as occupational and vocational knowledge (Kliegel, M., & Altgassen, M. 2006; Cattell 1957 in Philip et al. 2000).

# **Research Aims & Objectives**

The aim of the paper is to identify effective strategies that support teaching and learning in HE courses marked by age diversity with specific focus on older students. The study's objectives are as follow:

- To investigate specific intelligence- and age-related barriers and advantages underpinning the learning performance and achievement of older students.
- To explore strategies that empower older students to overcome challenges associated with age and intelligence.

# Research Method – Literature Review

The primary method employed is a literature review, using a system approach to literature search and data analysis. While recognising the limitations of literature review compared to empirical research, its advantages align well with this study's purpose - thorough examining existing evidence and theories on the interconnection between intelligence development, age and older adults' learning. Furthermore, it helps establish a theoretical foundation crucial for identifying a strategy to address challenges that older students encounter in learning in higher education. In addition, it also saves time and resources, considering a limited scope of this assignment. Finally, this review lays the groundwork for a subsequent empirical study.

The method entails a systematic search across several disciplines, particularly in education and psychology, involving key terms such as "older student", "fluid intelligence", "crystalised intelligence ", "learning ability" and "learning performance", conducted through the UH's online library platform. Inclusion criteria prioritize peer-reviewed journal articles published within the last three decades to ensure relevance and currency. Excluded studies include those on children, not in English language and inaccessible online.

For data analysis, the review critically evaluates and synthesizes the findings, methodologies, and theoretical frameworks of selected studies. Employing thematic analysis method, data is categorized, and common themes and patterns, as well as unique or contradictory aspects, are identified (Braun & Clark, 2006). As part of the analysis, the researcher's professional perspective as a senior lecturer in social work is explored through the production of a reflective account in teaching older students.

#### Findings and Discussion

This literature review comprises a selection of 10 studies (see Appendix A). Most of these studies employed quantitative designs, with two using mixed methods. Various formats of cognitive/intelligence testing were used to examine the correlation between age, intelligence, learning ability and learning performance. Several studies integrated contributing factors to learning, such as formal education (Kaufman et al., 2009; Kliegel &

Altgassen, 2006; Ackerman & Rolfhus, 1999), or traits or aptitudes (Ackerman & Rolfhus, 1999). While most studies examined across age-brackets, some only considered "older adults" and "younger adults" (Crawford & Lazar, 1996; Kliegel & Altgassen, 2006), and one study focused solely on individuals over 60 years old (Kelly & McLaughlin, 2010). Participants varied, including university students and general population. These studies were completed in countries of similar economic standards, namely US, UK, Australia, Germany, and Switzerland. All studies used intelligence theory, with Fluid Intelligence/Crystallized Intelligence Model as the key theoretical framework.

Three key themes emerged across these studies: 1) Formal education significantly influences an individual's learning and educational achievement; 2) General Intelligence tends to decline with age, particularly more significantly for individuals with lower intelligence; and 3) Strategic learning and teaching prove effective for older students in addressing challenges related to age and intelligence. This include adopting a strategic study approach and providing adapted feedback and instructions.

# Formal education significantly influences an individual's learning and educational achievement.

Formal education plays a pivotal role in shaping an individual's learning and education achievements, as evidenced by three studies involving over 1400 participants (Cliffordson & Gustafsson, 2007; Kaufman et al., 2009; Kliegel & Altgassen, 2006). The term "formal education" refers to primary/secondary schooling in the UK or high school in other countries, as well as undergraduate and postgraduate education. Kaufman et al. (2009) examined the correlation between intelligence, age, formal education, and gender, revealing that fluid intelligence (Gf) and Maths skills are more impacted by formal education compared to crystalised intelligence (Gc), reading and verbal skills. Interestingly, as people age, the impact of years of formal education become more pronounced on their Gc and Reading. For example, individuals aged 36 to 55 years of age with fewer years of education exhibit weaker Gc and reading skills than their counterparts with more extensive education. This correlation is less evident in younger age groups.

Using Adult Knowledge Structure, Ackerman & Rolfhus (1999) identified "general knowledge" as adult intelligence – a combination of Gf, Gc, verbal, knowledge. Their study suggests a significant association between adult intelligence and formal education, particularly for middle-aged people (35-55 years old).

These findings align with Ceci's (1991) comprehensive review of 200 studies, highlighting the crucial role of education in directly developing many of the cognitive abilities, including working memory, attention control, information processing and retention. These cognitive abilities underpin the success in intelligence test performance across all ages and subsequently contribute economic success in adulthood (Gurvern et al., 2017). However, Ceci (1991) noted variations in the strength of the effect on intellectual development across

studies, ranging from insignificant to significant levels (Ceci, 1991). Methodological differences, such as studying the effects of formal schooling separately or simultaneously with age and other factors, contributed to these varied results (Cliffordson & Gustafsson, 2007).

This finding holds particular significance for this study, as many older students, especially those in social work, nursing, and midwifery programmes, enter HE without formal qualifications (UCAS, 2023). Similarly, Kliegel & Altgassen (2006) notes that older adults often have less education than their younger counterparts. This, combined with age-related intelligence issues, places older students among the most disadvantaged categories in HE.

# General Intelligence tends to decline with age, particularly for individuals with lower initial intelligence levels.

According to the intelligence theory, adult intelligence comprises two key domains: Fluid Intelligence (Gf) and Crystalised Intelligence (Gc) (Cattell, 1963; Cattel & Horn, 1971). Gf and Cc are by far regarded as the broadest and most important intellectual abilities of humans (Ackerman, 1996; Carroll, 1993; Cattell, 1963; Hartung et al., 2018). A substantial body of research suggests that as adults age, Gf tends to decrease, while Gc increases until late adulthood (see Figure 1 below). These distinct age-related patterns have been observed for both sexes in large-scale studies (Cattell, 1963; Horn, 1971; Philip et al., 2000; Kliegel & Algassen, 2006; Kaufman et al., 2009; Crawford & Lazar, 1996). These patterns emerge from both longitudinal studies, which assess how intelligence changes over time, and crosssectional studies comparing intelligence among individuals of the same age, but differing in other factors, offering a snapshot of intelligence differences within a specific age group (Kliegel & Algassen, 2006).



#### Figure 1: Development of Intelligence

Source: Johnson & Finn (2017) pp.85
It is also evidenced that various factors moderate changes in Gf/Gc, including biological, cultural, health and years of formal education (Hartung et al., 2018). Numerous studies focus on years of education found that adults with higher ability (Gf + years of education) experience less impact from aging on intelligence. Both Ackerman & Roflhus (1999) and Hartung (2018) employed the Adult Knowledge Structure to measure adult intelligence and found a consistent theme: intelligence and age show a weak correlation in older adults, particularly those with higher abilities.

Ackerman & Roflhus (1999), studying 135 middle-aged adults (between 30 and 59), suggested that people with low Gf tend to maintain lower levels throughout their life, with more pronounced decline after 30 years old, especially when compared to counterparts with average or higher Gf. The study combined total Gf, Gc, verbal and nonverbal skills, experience, and knowledge into "Knowledge and Capacity for Knowledge", to predict learning ability. It concluded that people with higher Knowledge and Capacity for Knowledge are considered as more intelligent and their intelligence remained stable until late adulthood (Ackerman & Roflhus, 1999). This aligns with Gurvern et al.'s (2017) finding that more educated individuals consistently outperform less educated ones throughout their life, with high intelligence serving as a buffer against age-related decline. Consequently, individuals with lower intellectual abilities may face persistent disadvantages throughout their life, worsening as they age. Figure 2. visually demonstrates this phenomenon.

Figure 2: Learning Performance and age by high- and low-ability adults.



Source: Baytey and Oden (1955); Baller, Charles and Miller (1967).

#### Source: Fry P (1992)

# Strategic learning and teaching prove effective for addressing challenges related to age and intelligence among older students.

The impact of chronological age and formal schooling on the development of intellectual performance, which is also called the patterns of intellectual aging, plays a crucial aspect in education research and practice (Kevern & Webb, 2004; Cliffordson & Gustafsson, 2007). This informs educators about challenges that older students might face in learning. While learning ability is commonly accepted to not increase in older ages, findings of this review

reveal three key strategies that might improve older students' learning performance in both simple and high-demanding learning tasks.

# Strategic task approach

Kliegel and Altgassen's (2006) study compared Gf/Gc, learning performance, and task approach between two age categories – older adults and younger adults The result revealed that younger adults outperformed their older counterparts in all three areas. Notably, Gf, age, and task approach independently underpinned the learning performance of older adults. A significant finding was that the participants' ability to create and remember categories of objects (task approach tests) directly correlates with the number of the objects they could recall (learning performance tests). This underscores the critical role of a strategic task approach in learning. While fluid intelligence is typically deemed resistant to training, task approach can be improved through intervention. In essence, specific approaches to learning tasks, such as systematic categorisation of information or prearrangement of learning materials, can significantly impact learning performance (Gaskill & Murphy, 2004 in Kliegel and Altgassen, 2006).

This finding is relevant to social work training, where learning tasks and assignments require students to read, synthesize and analyse vast amounts of data of varied categories. For such tasks, organising and structuring learning materials prior and during task performing is crucial. Unfortunately, students often struggle to do so adequately, particularly older students with limited formal education who may lack experience with test or assignment situations (Dixon, deFrias, & Backman, 2001). As often observed, those who effectively organise and structure information before a dissertation supervision tend to remember and discuss information more effectively, leading to higher-quality dissertations. In contrast, individuals who have difficulties organizing and structuring information tend to find it harder to establish connections during a supervision session, resulting in poorly structured and written dissertation with inadequate analysis. Therefore, implementing a strategy to assist older students, particularly those with limited formal education, in organising and structuring their learning materials for a learning task may enhance working memory and overall learning performance.

Various strategic task approaches beyond categorisation can also aid older students in improving memory and learning performance, such as recalling exercise ((Hultsch, Hertzog, Dixon, & Small, 1998), intentional slowing of actions/processes, or streamlined learning aims and activities (Kruse & Schmitt, 2001). In summary, strategic task approach is a pivotal aspect of learning performance, as it seems to influence interpersonal and age-related variance in learning performance, and it is deemed to be modifiable.

# Strategic provision of Feedback

Feedback has been universally recognised as an integral part of the learning process, with timely and constructive feedback being the most recommended. However, Kelley and McLaughlin's (2010) study delved into determining the optimal level use of feedback required for different abilities of students' and for varying levels of complexity in learning tasks. They categorised tasks into complex ones associated with fluid intelligence (Gf) and simple ones associated with crystalised intelligence (Gc). While this categorisation may be problematic, it proves helpful in determining appropriate feedback levels. The authors argue that feedback should be less for students with high Gf and for simple tasks, while more detailed feedback should be provided for students with low Gf and for complex tasks. This implies that feedback levels should be maximised for students with low Gf undertaking complex tasks. Although this study focused on a population of over 60 years of age, it provides valuable insights into how individuals with varying abilities may respond to different feedback levels. This finding aligns with Butler and Winne's (1995) feedback model, which explained the effects of external feedback on performance as a cognitive system which includes factors such as knowledge, beliefs, motivation, goals, tactics, strategies, and internal monitoring process.

Upon reflection, the feedback mechanism currently used in social work programmes has been somewhat generalised, particularly concerning students' abilities. Limited consideration has been given to differences in learning ability, age, or prior formal education. For instance, the current Feedback & Marking Criteria form is universally applied to assess and grade assignments against specific standardised criteria for a programme level (e.g., level 4 undergraduate year 1), without recognising individual students' levels of ability or task complexity. It often falls upon individual lecturers to understand individual students' abilities and adapt their feedback accordingly.

## Strategic instructions

Research on training indicates that well-designed instructions, coupled with effective teaching strategies, can significantly enhance memory performance (Kausler, 1994; Saczynski, Willis, & Schaie, 2002 in Crow, 2010). Crow's (2010) literature review explored the impact of intelligence on students aged between 30 and 50 in computer-aided classrooms. One key finding emphasized the importance of considering students' ages and abilities when compiling manuals or instructions for tasks and assignments. The study argues that recognising the limited working memory of older students, instructions should employ familiar words that are already stored in their memory rather than introducing new or complicated terms that could overload their cognitive capacity. Similarly, instructions should avoid information overloaded, focusing on key information to allow the limited working memory to process and retain the content. Educators can facilitate this process by ranking the importance of information and prioritising the inclusion of the most crucial details in their instructions.

Adapted instructions are not a new concept. In fact, it has been widely adopted as part of differentiation approaches in teaching and learning. The approach is based on a notion that students learn and progress when they receive instructions that are tailored to their unique needs and characteristics (Tomlinson, 2014). The differentiation approach proposes an incorporation of a variety of instructional methods that appeal to different intelligences and cognitive strengths.

Upon reflection on the instructions currently used in social work programmes at UH, it is evident that substantial attention has been given to addressing a diverse student body, emphasizing clear structure, simple language, clarity, and accessibility. However, age and students' abilities appear to be aspects that have not been fully considered.

#### **Conclusion & Recommendations**

#### Implications and recommendations for social work training at UH

This review contributes insights to contemporary HE learning and teaching practices, characterised by diversity, particularly in terms of age, formal education and learning ability. The implications for social work training programmes are significant due to the following reasons:

- A substantial proportion of social work students are older individuals who have entered the social work programmes without formal qualifications. As suggested by the findings, these two factors independently impact on students' learning ability and learning performance.
- Social work programmes entail complex and demanding learning tasks and assignments, requiring a range of high-level cognitive skills and knowledge, including reading, writing, synthesizing, critical analysis, and reflection.

Acknowledging the crucial implications of age, formal education, and intelligence in HE is essential, albeit challenging to cater the diverse needs of students (Chickering and Gamson, 1987) particularly in large classrooms with multidimensional differences among students at various levels (Valiandes & Neophytou 2017). This study recommends addressing challenges faced by older students during training, by tailoring strategies based on intelligence theories. Educators can consider the following practices:

- Familiarize with intelligence theories and consider their implications in the context of their teaching.
- Lecturers within the same cohort should collectively have access to student profiles, particularly those with unique needs associated with their age, formal education, or cognitive ability.

- Encourage students, at the entry point, to take cognitive/intelligence tests. This allows
  for the identification of support mechanism to adapt to their cognitive strengths and
  weaknesses. It enables students to recognize their own resources and aids lecturers in
  designing strategic teaching and learning strategies, including:
  - Integrate advice and guidance on organising and structuring learning materials into instructions for learning tasks or assignments. This particularly helps students with less prior formal education, in optimizing their cognitive abilities for improved performance.
  - Consider using streamlined information and simple language when designing instructions and manuals, to help students with limited working memory to process and retain information more effectively.
  - Adapt feedback levels based on students' ability and the level of complexity of an assignment or a learning task.

These recommendations are in harmony with Herts Learning Principles. Recognising and responding to the challenges posed by students' age, intelligence and formal education resonates with the commitment to inclusive and accessible learning, which constitutes the core of Principle 1 "Prioritizes Student Learning". The application of strategic task approaches, strategic feedback and instructions align with Principle 2 "Ensure Coherent Design" emphasizing the importance of blended learning and teaching. Moreover, the understanding of student profiles, encompassing consideration for age, formal education, and cognitive abilities, aligns with Principle 3 "Offers opportunities for Personalisation" highlighting the importance of personalisation in assessment format and feedback mode.

## Limitations and gap for further study

This literature review provides insights into challenges related to age and intelligence encountered by older adults. It also outlines some strategic interventions to address the challenges. However, findings remain general, with limited understanding about the experiences of older students, and not specific for social work education. Therefore, it is recommended that empirical research be on older students enrolled in the social work programmes at University of Hertfordshire. The aim of this research would be using mixed methods to:

- Investigate how age, formal education, and intelligence impact on older students' learning performance and attainment.
- Experiment with one or more teaching and learning strategies recommended by the review, to identify what may enhance the learning performance of older social work students.

By delving into these specific aspects within the context of social work training at UH, the empirical study can offer targeted insights and practical recommendations tailored to the unique challenges faced by older students in this program.

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A	nnex B: Overview/Appraisal of selected articles for literature review - Kim Tran Authors year Country Title Overview Research Qualit quanti Mixe Research Design Theoretical Aims Sampe Age Key concepts Findings re Findings re Impact of Role of strategic Factors																			
	Authors	yea	ar C	Country	Title	Overview	Research Context	Qualit ative	quanti Mi tative d	ke Research Design	Theoretical framework	Aims	Sampe Size	Age range	Key concepts	Findings re Disadvantages of older learners	Findings re Advantages of older learners	Impact of Year of schooling on learning?	Role of strategic Task Approach	Factors contributing to better learning
1	Kaufman et al.	200	09 U	JS	How do educational attainment and gender related to Gf/Gc, and academic skills ages 22-90	This study used Intelligence theory to examine two collerations: educational attainment & adult intelligence; and educational attainment & number of years of formal schoolings. Analysis was performed on Data obtained from the US cencus, which is more generizable, across general population, but not focus enough to measure attainments of students who are or have been in higher education , which is the focus of the current study. Of & G are used as measures to identify the educational attainment. Findings: Educational attainments relates to 11 No. Of years of formal schooling, Maths skills (Gf & Gc); age impact more on Gf and Math skills, but not on G can drading skills. The study is helpful as it categorised participants into age groups, this helps understanding how intelligence changes through phases of life and the changes' impact on educational attainment	General populatio n		Yes	Kaufman Brief Intelligence Test using pure Gf & Gc (maths, writing, reading, verbala nonverbal) as the main measures and use age, years of schooling and genders as variables; 2) Brief Form of the Kaufman Test of Educational Achievement	Intelligence theory	To investigate association between cognitive ability/academic skills with 1) age; 2) education & 2) gender	two sets of 570 & 555, obtaine d from the US cencus data	22-35; 36-55; 56-70; 71-90	Intelligence, Fc/Gc, formal education, gender	older learners have reduced GF - maths and writing skills	Older age maintains stable reading skills and Gc	yes very strong related, but maths skills related stronger than reading and writing skills		
2	Kliegel M. & Altgassen M	200	06 s'	wizerla nd	Interindividual differences in learning performance: the effects of age, intelligence, and strategic task approach	This study also study the colleration between age-related resources (Gf/Gc), contributing factors and learning in adults. However it categorise participants into 2 age groups - young group (early and middle ages) and older group (over 60), which is not very relevant to intelligen-age research in formal education. Hence Learning here is defined as learning performance in general. This study is built on previous research evidence that older adults find learning and remembering new information more difficult, and it focuses on investigating what factors might moderate or helps older adults learn better. Differently from previous research, it usec a combination of three measure - personal resources (intelligence), tasks approach and learning performance to measure how age might impact or outperformed the older group in learning performance. but task approach does contribute to moderate the difference i.e. older group perform well with tasks involved repeated information or without pattertn recognising.	Higher Education		Yes	learning test performance by Delia Erocchetta 1986	Intelligence theory	To investigate how age-related sources (intelligence) and personal factors might contribute to learning of older adults	90 I adults	45 young & 45 old	Intelligence, learning performance, age related resources, task approach	The older group performed much lower scores in learning performance	reading	Yes, impacts on nonverbal (maths, writing), but no so on reading/ver bal skills		Repeated learning tasks and tasks without recognising patterns are proved to increase performance for older students
																The older ages have less number of years of formal education	5			

3	Philip et al.	2000 US	Explorations of	Using Gc, knoweldge (computerised knoweldge scale) and verbal (cloze	Higher	Yes	Completion test	Intelligence	To examine how 167	18-69	Crystalised	reading, Gc,	
1			crystallized	test and completion test) as measures to test age-affected adult learning	Education		original by Ebbinghaus,	theory with	completion test		intelligence,	general	
			intelligence,	to predict their academic achievements. 167 participants with ages			(filling missing letters	focus on Gc	and cloze test		verbal,	intelligence	
			completion tests,	ranging from 18 to 67. All participants obtained high school diplomas or			to complete a word) to	only	can assist in		knoweldge,	(combined	
1			close tests, and	equivalent which contributed to reliability of data it compares between			predict general		measuring		learning and	knowledge/Gc)	
			klnowledge	adults with the similar years of formal schooling. It found that whilst Gc is			intelligence; cloze test		domains in		academic		
				strongly associated with age, reading ability and general intelligence were			(filling missing words to		crystalised		achievement		
				found not associated with age			complete a sentence)		intelligence				
							orignial by Taylor 1953,						
							to predict reading						
							ability, prior knoweldg.						
							knoweldge after study:						
							and crystalised						
							intelligence, original by						
							HOrn and Cattell, to						
							measure prior						
							experience and						
1							knoweldge, including						
							verbal reading levical						
							knowlege						
							NIGHTER.						
							knowlege						

4	Crawford J. & Lazar S.	1996	i Australi a	Age differences in the realism of confidence judgements: a calibration study using tests of fluid and crystalised intelligence	This study involved 97 compsing of 1st year students from UNivesrity of Sydney and volunteer from Univesrity of the Third Age (for eldly peoplep), anging from 17 to 85 years old. The the study's method was to test the ability and confidence to judge how correct their answers were to test questions, in order to examine the difference associated with age in confidence judgement (between older and younger adults. This is more applicable in decision making process, for example, a doctor has to judge whether their diagnosis is correct. Findings suggest that while older adults performed worst in answering test questions, they are more confident in their judgement	Higher Education	,	fes -	Gf test, Gc test with more complex tasks than just traditional recall and recognition tasks, short-term memory test, and a test of visual discrimination. Participants provided their best answer to each test item first and rate how accurate their answers might be.	intelligence theory	To examine adult age difference in the accuracy or realism of their judgement on the correctness of their answers to test items	97	17-85	Gf, Gc, shorterm memory, perceptual discrimination, strategic defficiency	fluid intellignce, reduced memory soft-efficacy, reduced ability for resolution, slower response, reduced ability to discriminate between correct and incorrect answers	Gc, confidence judgement	highly efficient strategic process help performance in older adults. Stategic deficiencies of elderly is explained by deficient metamemory knowledge	
5	Hartung et al	2018	German Y	Dedifferentiation and differentiation of intelligence in adults across age and years of education	This study examined the correlation of age and years of education that influence the change of structure of intellgence. It's completed using Cognitive Ability Test and Academic Achievement Test on a fairly large sample size of 1984 of individuals aged from 25 to 93. Gf and GC were regarded as two main factors with Gf being tested on visualisation, concept of formation, analysis-synthesis and pair cancelation; whilst Gc being tested on oral vocablary, reading vocabulary and humanities (knowlege). The study found that only a small changes in the factorial structure of the gf-gc measurement model	General Populatio n			Cognitive ability test and academic achievement test	Intelligence theory	To examinie whether age and year of education moderate moderate the relation between Gf & Gc.	1984	over 25s	Gf, Gc, age, cognitive structural changes, declarative knowledge, CHC model			No	

6	Wenzel K & Reinhard	2019 Germar Y	Relatively unintelligent individuals do not benefit from intentionally hindered learning: the role of desirable difficulties	This study involved 149 participants who completed intelligence tests in two sessions. The second session was designed with more challenging tasks and in a more difficult testing condition. Ages of participants ranged from 17 to 70, in higher education setting. It found that while students of average higher ability (often younger) benefit better from difficult/challenging learning tasks, learners of lower ability do not.	Higher Education	two sessions of tests of intellige intelligence, testing on theory component of Cattell's intelligence theory. The second tests contained more challenging tasks and in a more difficult testing condition	ro test thrif y hypothesis that: 1) Intelligence prediction long term learning: 2) average an higher abili learner ber from diffic and challer tasks and i learners do 3) challeng tasks help	e 149 s is or y efit it ging wer v't; %8	18-70	average/higher ability learners, lower ability learners, learning condition, challenging tasks, long- term learning		Yes, students of average and higher intelligence benefit from more challenging tasks that deepen their learning process and strenthen their long-term learning, however, students of lower ability did not benefit from this	
							<ol> <li>challeng tasks help deepen the cognitive processing</li> </ol>	ng					

7	Kelley C & McLaug A-C	-M. 2	010 L	15	Feedback requirements for older adult learning: do cognitive abilities matter?	This study used Cognitive Load Theory as theoretical framework, which is about changes in cognitive resources throughout adult life that impacts on one's learning abilities. It looks into the optimal level of feedback required for different level of complexity of tasks - tasks associated with fluid abilities considered as complex, with cryalised intelligence as simpler. It argues that Gf or GG associated tasks should determine the level of feedback. It argues that people with high GF and simple tasks - feedback should be less, while people with how GF/cognitive resrouces, particularly with complex tasks, feedback should be more. Feedback also should be less of remotion tests. Feedback to guide the learner and provide motivation. But too much feedback might make learner become too dependent. However, this study was completed on the popluation of over 65 years old. The assumption is this age groups has less Gf and cognitive resources compared to the younger groups (under 5). This is problematics ais to deso not provide information about how feedback requirements should change across the lower age groups (18 – 25; 25-35; 35-45) who are often found to be in formal learning. Cognitive Load Theory (Sweller, 1998): learners has limited cognitive resources and addecrease in learning; Jobay): learners has limited cognitive resources and demand of the learning tasks (Gf or Gc) together determine the level of feedback required to help learner to retain and transfer information/knowledge	General populatio n	Ye	rs Yer	computer and technology experienc test; various ability test; (vacabular); working memory capacity; perceptual speed) and exit inverview ; computerised feedba was provided for low level tasks (correct/wrong answ and high level tasks (explaination of why answer is wrong/correct. Tests three stages (in differen days) to respond to three stag of learning: acquisitic retention, and transformation of the stages of the stages of the stages of the stages of the stage of learning: acquisitic retention, and transformation.	Cognitive Load Theory by Sweller (1998) :k r) n n r	To examime the level feedback suitable for learners with high/low cognitive abilies and for tasks demand (Gf or Gc) to increase learning (acquisition, retention and transfer)	38	over 65	Feedback; changes in cognitive resources; older adults, working memory; complex/simpl e learning tasks; task demand; learners of higher/lower ability, fluid/crytalised intelligence	Cognitive resources Gf-associated abilities	Gc and verbal associated tasks		Task demand: Fluid or crytalised intelligence associated tasks should be consider when designing a learnin task; GC associated tasks should be designed for lower ability groups; feedback is regarded as a function of cognitive resources and the demand imposed by the task.	Strategic use of feedback: more feedback for r Gf assoicated tasks, or for people with lower abilities; less r feedback for GG associated tasks and for those with average/high er abilities. Crytalised Intelligence/v erbal associated tasks require less feedback to produce more learning
8	Ackerm L & Rolt L	an P- 1 hus E-	999 l	JS	The locus of adult intelligence: Knowledge, abilities, and Nonability traits	This study invovies 135 participants from 30-59 years of age, from a university, with various years of formal education ranging from high school to PhD levels. It used Adult Knowledge Structure and ability tests to assess adult intelligence and knowledge of middle age, and to test the associations between traditional ability factors (Gf, Gc) and knowledge; interest & knowledge; personality and knowledge. It concludes that general intelligence (Gf, Gc and verbal ability) predict knowledge. It concludes that, with all combined together (Gf, Gc, verbal, knowledge) middle adults are on average more intelligent thatn young adults. Intelligence here means the capacity for knowledge and knowlege possessed (Henmon 1921, p.195). Capacity for knowledge is quite an important factors for learning.	Univessit y		Ye	<ul> <li>Using adult knowledg structures (4 knowledge scales- humanities; sciences; civics; and mechanica and ability test (verb: numeracy, spatial an mechanical knowledg to assess adult intelligence at middle age</li> </ul>	<ul> <li>Physiologically based intelligence A and</li> <li>Educational/ee ly perience based intelligence B.</li> <li>A is most sensitive to neurological incidents and disease, and B is most robust to such effects</li> <li>(Hebb 1941)</li> </ul>	To uderstand adult intelligence by assessing adult knowledge structure	135	30-59	Traits (Cattell 1971) or aptitudes (Snow 1989): interest, personality and motivation	Number and word fluency peaks early adulthood and decline at 50s	verbal mearning, spatial and reasoning abilities increase and research a peak plateu at at mid- age (40-60)	Yes, it found significant colleration between education and knoweldge in adult intelligence		
						Constrast between longititunal data and Cross-sectional data: LD suggest people's intelligence increase until age of 60, but C-S data suggests young adult outperform older adult in intelligence tests. What tests are reliable to measure Gc? Academic or practical tests? or real world problem solving? Judgement and decision making ability					Combined Cattell and Hebb: Intelligence as a proces (Gp), personality, interests (Gf/Gc) VS intelligence as knowledge (Gk)				intelligence as knowledge; intelligence as process; intelligence as exerpeince/ed ucation	GF	judgement ability; decision-making			

							Ackerman PPIK theory: explains the process of developing literature/soci al science knowledge from adolescent through early adult age to middle age. These two types of knoweldge are built up as a result of investigative interests, Artistic interests, and typical intellectual engagement scale						avocaltional knowledge; ocupational knoweldge, Gc capacity for		
					_								knowledge		
9	Crow A	2010	What age got to do with it? Teaching	This article is a literature review on disadavantages of older students in terms of working memory, speed information processing text processing	University	Literature review	Intelligence	Learning and	No sample	late 30s-	Viable syllabus;	computer aided		How much	strategic allocation of
			older students in computer-aided classrooms	and ability to seponse to stimulie. It recommended that to address these challenges in learning at older age (30-50), students themselves can use strategic resources to help them perform at their optimcal level, while educators may consider to allocate extra time; create manuel/guides/instructions with less reading, less information, only key information, familiar words/languages that activate learners' memory rather than forcing to use more memory capacity, and scaffolding			theory	approach suitable for older students		50s	capacity; resource allocation;	ciassroom		completed outside classroom? Considering mature adults having many other commitments?	resources
			older students in computer-aided classrooms	and ability to resonse to stimulie. It recommended that to address these challenges in learning at older age (30-50), students themselves can use strategic resources to help them perform at their optimcal level, while educators may consider to allocate extra time; create manuel/guides/instructions with less reading, less information, only key information, familiaw ords/apurgueges that activate learners' memory rather than forcing to use more memory capacity, and scaffolding			theory	approach suitable for older students		50s	capacity; resource allocation;	Respose to stimulie		Extra time for tasks	more instructions
			older students in computer-aided classrooms	and ability to response to stimulie. It recommended that to address these challenges in learning at older age (30-50), students themselves can use strategic resources to help them perform at their optimcal level, while educators may consider to allocate extra time; create manuel/guides/instructions with less reading, less information, only key information, familiaw oxrds/languages that activate learners' memory rather than forcing to use more memory capacity, and scaffolding			theory	approach suitable for older students		50s	capacity; resource allocation;	Respose to stimulie slower in reading and processing information		tear mig tasks should be completed outside classroom? Considering mature adults having many other commitments? Extra time for tasks	more instructions Manuals with streamlined information

											reduced working memory and speed			ranking the importance of information to put in the manual or guide to help older adult to learn key information as their reduced working memory cannot hold
														too muh information
											Acgiuring new skills			Scafolding
											computer and text			
											processing			
10	0 Vuolo	2010 UK	An exploration of the experiences of mature learners (post qualified nursers) using a managed learning environment for the first time	This study used mix-methods to understand the experiences of mature nursing students in using MLE. Although survey was completed on 90 students, but interviews were only with 5 students. All students were female. Therefore, findings are not generisable. However, it is relevant to my study because it addresses the issues of learning of mature students and suport they might need to overcome challenges. although it deesnt use intelligence theory as theoretical framework to examine how age- associated intelligence might impact on learning of mature students, the issues are associated with aging - reduced ability to learn new information and recognise patterns (IT, technology-aided flatform - MLE), hence it is useful to further understanding about challenges that mature students might face in learning.	university , post- qualifed nurse course	Yes	Defferntiation approach; blended learning	26	5-58	MLE	IT, technology-aided learning	using support from others	preparation is key, both pre-course and pre-lessons	on-going support; skills support; buddy system
														Precourse training to train IT skills, academic skills
														different sources of support: family, friends, peers, lecturers
														support prior and post lessons discussion in class to