Supporting Students in a Changing Educational Climate: A Systems Engineering Case Study

Stephen G. Barker, Cranfield University, United Kingdom

The Asian Conference on Education 2021
Official Conference Proceedings

Abstract
Whilst the coronavirus pandemic has posed andragogical and pedagogical challenges to educational establishments in how they restructure courses to permit continued delivery in an online world, it has also caused significant disruption to students, not least in terms of how they have maintained their ability to continue to study and learn. A significant element in this is how student learning preferences such as experiential/practical or traditional lecture-based study have been served or disrupted by the revised delivery mechanism(s). This is particularly the case where the subject matter is management or engineering-related, and requires a great deal of interaction and collaborative multi-stakeholder work. Where the course is being taught at level seven, and therefore requires self-directed learning, this is even more the case. This paper considers those student learning preferences in this light, and studies the extent to which teaching andragogy has been modified to utilise activities which safeguard learning styles and facilitate continued effective learning. To do this, different learning styles and preferences are analysed, and a study is made of how these were satisfied in pre-pandemic education, using a Systems Engineering MSc course as a case study. Practice during the coronavirus pandemic is then considered to gauge how effective changes to course delivery made necessary by the situation were in supporting learners during this period and facilitating their further study and progression toward their desired qualification. Successes and failures are described, and conclusions are reached on how learning preferences can be better supported andragogically on an ongoing basis.

Keywords: Andragogy, Supporting Students, Systems Engineering

Introduction

The coronavirus pandemic which began in 2019 (WHO, 2021) caused several problems for the education sector. In the United Kingdom, as in the rest of the world, measures were introduced in March 2020 to attempt to control the spread of the coronavirus. Principally, these were (UK government, 2020):

1. Requiring people to stay at home, except for very limited purposes.
2. Closing certain businesses and venues.
3. Stopping all gatherings of more than two people in public.

From a university perspective, the challenges presented by this centred around how to keep operating, doing consultancy, delivering educational offerings, and continuing to research in order to remain viable financially. From a course delivery perspective, the focus became 'how can we continue to deliver education and training under pandemic conditions?'. The main obstacle in this respect was to devise a method of being able to facilitate teaching and learning that did not involve face-to-face (F2F) delivery. Whilst lessons could be learning from other education providers whose delivery mechanism had always been predominantly at distance, such as the UK Open University (Open University, 2021), certain courses rely o F2F delivery to realise the full learning potential of the student and their wider cohort, allowing them to fully explore the topic area. Systems Engineering is one such topic, and Barker (2021) explored the difficulty in maintaining delivery of such a course, using Cranfield University's Systems Engineering MSc and apprenticeship (Cranfield University, 2021) course as an example. One of the andragogical challenges was found to be that as a UK level 7 (UK government, 2021) course, "the focus must be on activities that allow students to explore the use of concepts in situations which are as realistic and reflective of real-world scenarios as is possible" (Barker, 2021). With systems engineering, this is particularly challenging due to the multidisciplinary, highly interactive nature of the topic. Although the essentials of the topic could be delivered through lectures and supervised exercises (Bligh, 1998; Bonesso et al., 2015; Garside, 1996) packaged either as live online taught sessions or voiced over slides hosted on a virtual learning environment (VLE) platform, inculcation of interactive hands on experience, and experiential learning more generally, essential to level 7 learning and as advocated by Pugsley & Clayton (2003) and Illeris (2007), proved to be a more difficult problem to solve. This was a key issue as it was also central to the student learning experience, and with that in mind, the needs of the students and how they may be supported in their learning journey was an important consideration when planning the revisions to educational delivery made necessary by the coronavirus pandemic. Set against the measures introduced to combat the coronavirus, students faced a number of difficulties, such as studying and working from home whilst balancing this against family life, and other factors such as the worries and psychological pressures imposed by 'lockdown'. In particular, Coronavirus measures posed the following difficulties to students in respect of continuing to study:

- No F2F study possible, and being unable to access onsite university facilities
- Students were called away from study for work purposes or family matters, meaning that their studies were interrupted
- The time that students were able to spend on study was reduced, and
- A dependency on their own IT infrastructure meant that students sometimes experienced connectivity issues and were thus unable to access online resources or join live taught sessions

This paper will consider how the Cranfield Systems Engineering MSc course team went about supporting students in the face of these difficulties, tuning delivery mechanisms to maintain the learning experience, and continuing to meet student expectations. The needs and expectations of the student learning experience is first considered, before the methodological approach to refining the teaching andragogy and supporting students' learning is described, and results are stated. Conclusions and further work are then evaluated.

Student Needs and Expectations of Learning in an Online World

In order to understand how to better support students, it is important to understand their needs, and that these in turn are influenced by individual circumstances, motivations, and expectations. Before we examine these, however, it is useful to set out how students were supported in pre-coronavirus times. Generally, from an academic perspective, students are allocated a mentor to whom they can turn with any queries about the course, or any difficulties that they might have with course material. Students can also make recourse to the Course Director with any queries or complaints, and can consult with the student administration team to discuss marks or matters of progression through modules and the wider course. From a pastoral perspective, students can talk in confidence to the Flexible Education Coordinator – a member of the course team dedicated to solving student problems – or can speak directly to the Student Support team based within the academic school. Any issue raised by a student is treated with utmost confidence. A more complete summary of these support paths is provided at table 1 overleaf. During the pandemic, theses services remained available to students, albeit virtually rather than F2F, and the nature of support offered was varied due to the pressures experienced by students in what were quite unique circumstances. In order to examine how student needs changed – and therefore the requirement to support was altered, it is necessary to consider the circumstances in which students found themselves – or in this context "blockers" and other factors affecting student learning – as well as student motivations and expectations.

The literature describes a number of potential "blockers" to student learning. Ehrhardt & Archambault (2020) argue that the attitude and disposition of students is a critical factor, whilst Palmer et al (2017) list conceptions of learning and knowledge; pedagogical design of module and course; relationships, socialization and collaboration; interaction; accessibility and perceived ease of use; clarity of purpose and approach to task; student agency and autonomy, and quality content as being key factors to consider. Wilson (2012) highlights time available to learn or study as being important, whilst age is cited by Truluck et al (1999). Kolb (1984) and Shneiderman (1998) point to how individuals learn as being a central factor, and this is corroborated by the work of Honey and Mumford (1982) on leaning styles. All of this has to be set in the context of ensuring the required quality (QAA, 2014) and right level of learning (Bloom, 1979). These works suggesting blockers to student learning broadly support experiential findings based upon delivery of the course over a number of years. Importantly, many of these factors were impacted, or exacerbated, by the coronavirus pandemic.

Support Path		Support offered
Mentor	(Primarily) Academic	Queries about course material, any issues or difficulties with course progression etc
Module Leader	Academic	Queries regarding individual module material or assessment

Course Director	Academic	Queries about the course either directly, or elevated from discussions with mentor or module leader; Complaints about course or marks awarded
Student Administration team	Academic	Queries with regard to progression, marks, or process
Flexible Education Coordinator	Pastoral	Problems other than academic in nature usually course-based
Student Support team	Pastoral	Problems likely to be of a more serious nature other than academic
Information Technology	IT	Issues with information technology generally, and online university resources in particular
Library support team	Library	Obtaining library references and sources, study support

Table 1: Support Available to Students Pre-Pandemic

In addition, there are the blocking factors which have been found to be particular to the coronavirus pandemic. Savage (2021) writing in *The Guardian* newspaper online discussed the rise in loneliness and mental distress due to being required to work from home, whilst Ellis (2021) writing in *CEO Magazine* suggested that working away from the office created more pressure as people felt the need to prove themselves more, and were thus working longer hours. Student feedback showed that this psychological pressure was only compounded by the need to balance family life against work and study, as schools were also closed due to the pandemic, and this resulted in less time to study, and a reduced ability to study in a structured manner. Moreover, reliance on personal IT infrastructure caused issues with study as identified earlier in this paper. Such is the phenomenon that the UK National Health Service offered advice on how to look after mental wellbeing whilst working at home (NHS, 2021). Blockers to student learning can thus be summarized as follows:

- Work and family pressures
- Psychological factors
- Potentially limited by lack of IT infrastructure
- Not able to learn in preferred way
- Individual learning style
    - Preference for particular teaching/learning method – i.e, taught lectures, individual research task, group workshops etc
    - Potential lack of access to facilities
- Individual learning preferences
    - Technology enhanced learning (TEL) seen by some as more restrictive than F2F activities
    - Need to maintain standards of educational offering

Based this thinking, and building upon experience of delivering the course, it might be possible to suggest factors which influence learning. These are described at table 2:

Factor	Type of influence
Age	Age may relate to a preference for F2F learning, or ease of adoption of online learning techniques
Experience of the individual	The greater the level of experience, either in the

	workplace or with the subject matter, the more likely the individual might be to be able to conceptualise, rationalize, and reflect upon concepts and issues
Length of time out of education	If out of education for a period of time, the individual is more likely to require increased guidance, and could be reluctant to put forward their own view
Learning style and preference	A preference for formally taught methods, or for less structured workshops will affect how an individual learns
Inclination to learn/Motivation	The reason for study could affect an individual's determination to succeed, and to adapt to revised teaching and learning andragogy
Level of previous qualification	Individuals without previous qualifications, or with relatively low-level qualifications, are likely to exhibit a preference for more formal teaching methods

Table 2: Factors Influencing the Ability to Learn

Truluck et al (1999) suggests that with age, learning preferences alter; there is a tendency toward hands on application, perhaps when combined with knowledge gained through experience. This would suggest a leaning toward a preference for F2F learning with an emphasis upon interaction and the ability to bring experience to bear on real life case studies in workshop conditions. At the same time, evidence suggests that older individuals are less inclined toward IT-based solutions (Henshaw et al, 2012; ONS, 2019), and as a result of this, it might be suggested, could be less accepting to online learning. Conversely, the ONS (2019) research shows that younger adults are more likely to embrace IT, and might therefore be more comfortable with online-only learning. Experiential learning (Kolb, 1984; Kayes et al, 2005; Hawtrey, 2007; Siberman, 2007) is deemed to be a key facilitator to learning, allowing individuals and groups to share experiences, learn from experience, and bring experience to bear on problem situations, and again this might lend itself more toward F2F learning than online study.

Experience of delivering the course suggests that those who return to study after a period away exhibit a preference for more formalised or structured teaching method techniques, whilst Garside (1996) and Fry et al (2009) demonstrate that individual learning styles and preferences affect how an individual learns. Methods such as MBTI (Briggs-Myers et al, 2003) tend to support this by suggesting that individuals can be "typed" as *Introversion/Extroversion, iNtuition/Sensing, Feeling/Thinking,* and *Perception/Judging*, and that this dichotomy can be used to inform understanding of how an individual might learn, and what their preferences might be. Honey and Mumford (1982) produced a categorization of learning styles, detailed at table 3 below, which further suggested that preferences dictate how individuals learn.

Classifier	Descriptor
Activist	Responds most positively to learning situations offering challenge, to include new experiences and problems, excitement and freedom in their learning
Reflector	Respond most positively to structured learning activities where they are provided with time to observe, reflect and think, and

	allowed to work in a detailed manner
Theorist	Respond well to logical, rational structure and clear aims where they are given time for methodical exploration and opportunities to question and stretch their intellect
Pragmatist	Respond most positively to practically based, immediately relevant learning activities, which allow scope for practice and using theory

Table 3: Categorisation of Learning Styles (Honey and Mumford, 1982)

Finally, experience suggests that where an individual either does not have a previous qualification, lacks experience in the subject matter, or possesses a qualification which might be considered relatively low-level, then they will expect for formal instruction in the topic with guided exercises and worked solutions, and this might again indicate a preference for a more structured teaching method.

Student Motivations and Expectations

The motivation of students is an important factor in their will to succeed at studying and completing the course. Motivational theory as set out by the likes of Herzberg (2017), Maslow (1943), and analysed by the likes of Pardoe (1990) and Bassett-Jones and Lloyd (2005) sets out a hierarchy of motivational factors, ranging from core needs to self-fulfilment. It can be argued that if the need is sufficiently important, such as a pre-requisite for promotion, or professional membership for example, then the student will be more determined to achieve the qualification, and thus more ready to adapt to changing circumstances and constraints, than they would if the course was merely being undertaken for the purposes of continual personal development, and its completion held no intrinsic consequence.

Student Expectations are another key factor when considering how support of their studies needed to evolve in the face of the pandemic; expectations vary with the individual, but discussions with students showed that despite a need to change the delivery mechanism of the course, there was still an expectation that quality would be maintained to the required standard (QAA, 2014), and that variety of teaching methods will still cater for individual study and learning preferences. Thus, the concept of ‘blended learning’, utilizing a mix of formal lectures and exercises, and more informal and unstructured workshops and research activities to maintain student interest and enthusiasm (Ramsden, 2003) previously utilized, needed to be adapted and maintained in an online educational environment. Barker (2014) researched student expectations for both education and training in pre-coronavirus times, and these are shown at table 4. It became evident that in discussions with students that broadly these remained true of any adapted delivery mechanism to facilitate continued teaching through the pandemic.

	Training	Education
Delivery Structure	Structured, highly regulated	Less structured, more interactive
Format	Formal Lecture, structured workshop	Lecture and workshop

Teaching style	Formal instruction	Debate, peer workshop
Interaction	Minimal	Expression of opinion
Lecturer view	Taken as authoritative	Challenged through debate
Personality “type”	Untailored	Tailored

Table 4: Student Expectations of Learning Experience (Barker, 2014)

It can be noted that should the course have been training rather than education in nature, the process of adapting to online-line only delivery would theoretically have been simpler as the highly-structured nature of training would have loaned itself more readily to tightly-packaged online live sessions, mixed with voiced-over presentations and bounded exercises with worked solutions. An educational offering at level 7 (UK government, 2021), however, needed to maintain the interactive unstructured workshops that would stimulate debate, exploring different possibilities, and facilitating the reflection vital to the understanding of complex issues (Biggs and Tang, 2007). Having considered student needs and their implications for course study support, along with motivations and expectations of study, we will now focus on the process of affecting the necessary change to implementing revisions to that support.

Methodology and Application

After initial discussions with the Systems Engineering MSc course team, it quickly became clear that it would be necessary to review the existing course structure, summarised at table 5 overleaf, and evaluate how much of the delivery mechanism could be transferred directly online, and how much would have to be altered or redesigned. How the revised educational offering could be facilitated would then have to be addressed, before viewing the intended revised delivery mechanism through the prism of student expectation as discussed above to ensure that it could maintain relevant educational standards (QAA, 2014) and meet student needs. The last step of the approach would be to agree the final shape of the andragogical structure, and to put in place revised student support mechanisms. Thus, the methodology for undertaking the process of revising the course offering was as described below.

1. Review existing course structure and identify alterations necessary to facilitate online-only delivery
2. Plan how the revised offering could be facilitated
3. Consult on how this could be made to meet with student expectation
4. Revise the andragogical course offering
5. Put in place the necessary student support mechanism

It was noted that discussion with students would be needed regularly throughout the process, and that feedback would need to be sought before, during, and after module delivery to enhance the learning process as far as was possible.

		Teaching Mechanism	Intended Purpose
1.	Introductory module	Lectures	Understanding of basic principles
		Tightly-specified exercises	Reinforcement of understanding
		Worked examples	Demonstration of issues
		Prescriptive assessment	Application of models

2.	PG Certificate modules	Lectures	Key principles
		Exploratory exercises	Testing of concepts
		Managed workshops	Experiential learning; peer-to-peer learning
		Open-ended assessment	Judgemental application, exploration of issues
3.	PG Diploma modules	Short interactive taught sessions	Exploration of key issues
		Individual research	Investigation of issues and effect on workplace issues
		Group workshops	Student-led application and critical evaluation
		Reflective assessment	Individual reflection on issues and outcomes
4.	Capstone workshop module	Short interactive brief	Brief explanation of task
		Student-led group workshop	Exploration of real world problem solution across a project lifecycle
		Reflective assessment	Group presentation & portfolio; individual reflection on issues and outcomes

Table 5: Summary of Pre-Pandemic Systems Engineering Msc Course Structure

The process by which the course was modified for online delivery is set out in Barker (2021), but broadly it was recognised that interaction with students would be vital, and so live sessions where possible would be key to providing necessary understanding and support, and these could be supplemented by voiced over presentations and bounded, well-defined exercises to illustrated key points and develop that understanding. The more unstructured elements required in order to meet relevant standards and level 7 capabilities proved to be more of a challenge, but it was thought that by using case studies to provide a realistic setting, and challenging students to apply their learning and experience I a semi-guided way facilitated by Q&A sessions and 'thought bombs' that experiential learning could be fostered in a problem-based scenario.

In adopting this blended strategy, online learning could be facilitated by replacing F2F sessions with 'live online' taught sessions, revised to be shorter and more impactful than traditional lectures so as to facilitate student learning given the blockers identified earlier in this paper. Bounded exercises could be replicated by hosting them on a virtual learning environment (VLE) and supporting them with live Q&A sessions. Research tasks could be managed in the same way, with the provision of increased feedback and ideas intended to generate debate amongst the cohort, whilst more unstructured workshops could be facilitated by setting up group areas on the VLE, and managed group 'online chat rooms' to foster peer-to-peer study and learning.

This was placed in the perspective of student expectation through both group and individual discussions. Communication was recognized as vital to the process, and ideas were worked through with the cohort to ensure understanding and buy in, whilst individual discussions were held with students to allay concerns, and understand their particular needs and issues when studying at distance. Students were encouraged to speak to staff as relevant (see table 1) as often as they felt as necessary, and additional mentor slots were made available to support students as was needed. Bespoke teaching slots were also made available to cater for student learning styles. So, for example, students who identified as theorists in Honey and Mumford's 1982 classification of learning styles, or who had been out of education for a period of time, were able to book additional teaching sessions to review and discuss taught ideas, whilst pragmatists were likewise encouraged to discuss their ideas for practical application. Were students were concerned at the increased use of IT, they were offered support in ensuring that they understood how to connect with, and access, resources. Moreover, live sessions were recorded so as to afford the maximum level of flexibility to studies in managing their studies given the pressures of lock down. In a similar vein, course material was made available earlier than previously to give students more time, and to allow additional time for understanding and asking of questions.

Consultation with students agreed that this provided a basis to proceed, and the offering was then developed as described in Barker (2021). Feedback and experience prompted regular review and update to the delivery mechanism both at module level, and across the wider course.

In addition to the course-based support described in the above paragraphs, tutorial sessions were offered by administrative and support staff to ensure that students were aware of any revisions to processes, and to make sure that the learning process and progression were made as smooth as possible. Students were also encouraged to seek pastoral help should they feel that they needed it, and additional slots were made available specifically to deal with this. Apprentice students were also offered more time with academic and support staff to understands how the revised andragogy for delivery would affect their studies, and to guide them in respect of their apprenticeship path as a result.

Results and Outcomes

As mentioned earlier, the process of delivery and student support was modified and refined in line with student discussion and feedback, and as experienced of the revised mechanism was gained. The key outcomes are outlined and summarized below:

- Take up of learning offerings improved
- Greater student involvement was witnessed
- Improved feedback from students increased and demonstrated approval of the revised course offering
- Maintenance of desired level of quality in teaching and learning
- No reduction in assessment performance
- More coherent module- and course-level educational offering
- Dissemination of practice and outcomes led to enhancement of other educational offerings

Conclusions and Further Work

This paper describes the efforts of the course team for Cranfield University's Systems Engineering MSc to ensure that students continued to be appropriately supported through changes to the andragogical strategy caused by the coronavirus/Covid-19 pandemic. Blockers to study are analysed in the context of the required andragogical changes, and student motivation and expectations are also considered. The pre-coronavirus structure of the course and support arrangements are also presented, before the methodology for implementing change to the support strategy is described, and its application is discussed. Finally, outcomes are stated.

The work detailed in this paper was highly iterative, and that allowed errors or unsuccessful ideas to be quickly corrected. It was found that different students had contrasting attitudes to online-only teaching, and that continued communication before, during, and after the process of module- and wider course-teaching was essential in allowing students to understand in good time what would be expected of them, how they would be taught, and how they would be supported. Flexibility of teaching and support offerings was also important in the light of pressures placed upon individuals due to coronavirus measures such as working from home. The resulting support structure has been largely successful in use, and has been received well by students as results and outcomes suggest. Pleasingly, no significant drop in student performance in assessment was evidenced.

It must be noted that despite successful implementation, this study covers a limited number of student cohorts, so further work and application needs to be done before the process can be deemed an outright success. Moreover, with additional time to reflect and gather feedback, it is expected that other ideas for improvement will be identified and implemented. A further task will be to propagate ideas and achievements across other courses more fully.

References

Barker, S.G., (2014) *Post Graduate Certificate in Learning, Teaching and Assessment in Higher Education.* Cranfield University

Barker, S.G. (2021) Altered Andragogy: Lessons from Lockdown for Systems Engineering Education. *IAFOR 9th European Conference on Education.* 15th-18th July 2021. London.

Bassett-Jones, N., and Lloyd, G. C. (2005). Does Herzberg's motivation theory have staying power?. *Journal of management development*.

Biggs, J., and Tang, C. (2007) *Teaching for Quality Learning at University*. 3rd ed., U Press, UK

Bligh, D., (1998) *What's the use of lectures?*. Intellect books.

Bloom, B.S., (1979) *Taxonomy of Educational Objectives, Handbook 1: The Cognitive Domain.* David Mackay, New York

Bonesso, S., Gerli, F., & Pizzi, C. (2015). The interplay between experiential and traditional learning for competency development. *Frontiers in psychology*, *6*, 1305.

Briggs-Myers I, McCaulley M.H., Quenk N.L., Hammer A.L. (2003) *MBTI Manual 3rd Edition*. CPP Inc, Palo Alto, US

Cranfield University (2021) "Systems Engineering MSc" by Cranfield University: https://www.cranfield.ac.uk/courses/taught/systems-engineering?gclid=EAIaIQobChMI1L_FuemU8gIVmd_tCh1xJQgtEAAYASAAEgKhuvD_BwE (viewed June 2021)

Ehrhardt, D., & Archambault, C. (2020). "The Gods Must Be Crazy": Students' Attitudes and Dispositions as Enablers and Blockers to Internationalization. *Journal of Studies in International Education*, 1028315320964282.

Ellis, C. D. (2021) *The pressure of being permanently 'on'.* CEO Magazine: https://www.theceomagazine.com/business/health-wellbeing/work-from-home/ (viewed December 2021)

Fry H, Ketteridge S, and Marshall S (eds.) (2009) *Teaching and Learning in Higher Education: Enhancing Academic Practice 3rd ed.* Routledge, UK

Garside, C. (1996). Look who's talking: A comparison of lecture and group discussion teaching strategies in developing critical thinking skills". *Communication Education*, *45 (3)*

Hawtrey, K. (2007). Using experiential learning techniques. *The Journal of Economic Education*, *38*(2), 143-152.

Henshaw, H., Clark, D. P., Kang, S., & Ferguson, M. A. (2012). Computer skills and internet use in adults aged 50-74 years: influence of hearing difficulties. *Journal of medical Internet research*, *14*(4), e113. https://doi.org/10.2196/jmir.2036

Herzberg, F. (2017). *Motivation to work*. Routledge.

Honey, P. and Mumford, A. (1982) *The Manual of Learning Styles.* P. Honey, Maidenhead, UK

Illeris,K., (2007) What Do We Actually Mean by Experiential Learning?. *Human Resource Development Review. 6 (1), 84-95.*

Kayes, A. B., Kayes, D. C., & Kolb, D. A. (2005). Experiential learning in teams. *Simulation & Gaming*, *36*(3), 330-354.

Kolb, D,A, (1984) *Experiential Learning: Experience as the Source of Learning and Development*. Prentice Hall, UK

Maslow, A. (1943). Maslow's hierarchy of needs. *Index of DOCS/Teacing {sp} Collection/Honolulu*.

NHS (2021) *7 simple tips to tackle working from home*. NHS Online: https://www.nhs.uk/every-mind-matters/coronavirus/simple-tips-to-tackle-working-from-home/ (viewed December 2021)

ONS (2019) *Exploring the UK's digital* divide. Office for National Statistics: https://www.ons.gov.uk/peoplepopulationandcommunity/householdcharacteristics/homeinternetandsocialmediausage/articles/exploringtheuksdigitaldivide/2019-03-04 (viewed December 2021)

Open University (2021): https://www.open.ac.uk (viewed December 2021)

Pardee, R. L. (1990). Motivation Theories of Maslow, Herzberg, McGregor & McClelland. A Literature Review of Selected Theories Dealing with Job Satisfaction and Motivation.

Pugsley, K.E., & Clayton, L.H., (2003). Traditional Lecture or Experiential Learning: Changing Student Attitudes. *Journal of Nursing Education*. *42 (11)*

QAA (2014) *UK Quality Code for Higher Education Part A: Setting and Maintaining Academic Standards.* QAA Gloucester, UK

Palmer, E., Lomer, S., and Bashliyska, I. (2017) *Overcoming Barriers to Student Engagement with Active Blended Learning*. University of Northampton interim report

Ramsden, P. (2003) *Learning to Teach in Higher Education 2nd ed.* RoutledgeFalmer, UK

Savage, M. (2021) *Revealed: rise in stress among those working from home*. The Guardian: https://www.theguardian.com/business/2021/jul/04/revealed-rise-in-stress-among-those-working-from-home (viewed December 2021)

Silberman, M. L. (Ed.). (2007). *The handbook of experiential learning*. John Wiley & Sons.

Shneiderman, B. (1998) Relate-Create-Donate: A teaching/learning philosophy for the cyber-generation. *Computers & Education, 31 (1), 25-39*

Truluck E., Bradley C. Courtenay, J. (1999). Learning style preferences among older adults. *Educational gerontology*, *25*(3), 221-236.

UK Government (2020) "Staying at home and away from others (social distancing)". https://www.gov.uk/government/publications/full-guidance-on-staying-at-home-and-away-from-others (viewed December 2020)

UK Government (2021) "What qualification levels mean" by UK Government: https://www.gov.uk/what-different-qualification-levels-mean/list-of-qualification-levels#:~:text=level%207%20NVQ,postgraduate%20certificate%20in%20education%20(%20PGCE%20) (viewed June 2021)

WHO (2021) "Coronavirus disease (COVID-19) pandemic". World Health Organisation: WHO/Europe | Coronavirus disease (COVID-19) outbreak - About the virus (viewed December 2021)

Wilson, S. (2012). Drivers and Blockers: Embedding Education for Sustainability (EfS) in Primary Teacher Education. *Australian Journal of Environmental Education*, *28*(1), 42–56. http://www.jstor.org/stable/26420534