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Educating the educated: challenges in teaching acoustics to students with existing working experience

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ABSTRACT

In the UK a quarter of all students are mature students and many of them have work experience relevant to their subject of study. These students can continue their jobs whilst studying for a higher degree.
When teaching an acoustics-based discipline, it is always important to explore what is the background of the individual students, and how their experience and previous education could be utilised best to progress into the new level of knowledge. The other challenge is the allocation of time for teachers to engage with the students. Considering that the students have full time jobs, their time for study is limited, and this should be reflected in timing of tutor's comments. The deadlines for the projects and assignments should also reflect this.
Depending on the group of students' mixed education-and-experience backgrounds, the teaching of acoustics should be tailored by the tutor to ensure maximum involvement of the students as a group and as individuals. The tutor also should be flexible to adjust the material to the needs of the particular group of students.

1 Introduction

Everyone has the right for education, according to Higher Education Act (2004) [1], and everyone can receive education at the time in life when it is convenient or becomes required.

Although sometimes it feels like higher educational institutions are primarily trying to appeal to younger people, mature students are also joining undergraduate and postgraduate courses.

HE student enrolments by personal characteristics

Academic years 2016/17 to 2020/21

Show: Number Percent

Country of HE provider: All Domicile: All

First year marker: All Level of study: All Mode of study: All

	2016/17	2017/18	2018/19	2019/20	2020/21
Age group					
20 and under	963,045	980,690	986,170	1,003,760	1,037,155
21-24 years	651,815	675,360	699,170	732,615	783,775
25-29 years	266,475	269,690	274,215	289,360	338,460
30 years and over	495,405	488,780	496,780	506,495	592,195
Age unknown	225	225	210	160	275

Figure 1. Higher Education students' enrolment for years 2016-2021

Higher Education Statistics Agency (HESA) [2] demonstrates that minimum one third of students in 2018 were mature students, who are starting their education at the age over 21 (for undergraduate degree) and over 25 (for postgraduate diploma and degree). In UK, additional to the main academic institutions with their wide-spectrum education courses, there are distance learning courses and compressed-hours courses such as the diploma at the Institute of Acoustics, or the courses provided by the Open University. It had been noted by HESA that the Open University has reported in the last 5 years that more than double the number of first year students joining the studies across many disciplines [2].
Figure 1 shows the breakdown of students by their age in the years between 2016-2021 [2].

The percentage of mature students has been fluctuating depending on the global or national economy rises and downturns, or, for example, during the recent global pandemic. People decide returning to studies they had terminated before or seeking a complete change of their career by studying a new subject. When the subject of study is to be chosen, quite often the students rely on what they already know or are passionate about, or have the experience of working on in their day-to-day jobs.

Various academic institutions across the UK have developed flexible approaches aimed at matching educational needs for mature students. This includes, for example, undergraduate compressed-hour programmes such as degree apprenticeships. The apprenticeships are collaborations between a company/ organisation and the HE institution providing teaching to their staff. The apprenticeship schemes are offering employers the chance to educate their new and existing employees and help them to get a university degree. According to the statistics provided in [3], in 2018-2019, 53% of Level 6 degree' apprentices and 96% of Level 7 degree' apprentices were students aged 25 or over.

2. WHY MATURE STUDENTS COME TO STUDY?

Approaching higher education studies as a mature student can be both exciting and difficult. The students should consider several factors when they are choosing where and how to study: online or in-person, distance learning or compressed hours courses such as apprenticeship courses (i.e. [4, 5]).

The Open University (OU) [4] runs regular surveys among their students (including Engineering, Design and Technology students), and publish the case studies on their website. Many students across disciplines have confirmed that they have great support from their family and loved ones, however,where the employers were not supportive to the students, this created extra difficulties in their study.

Several studies had been conducted on motivation for mature students (i.e. [6], [7], [8]). The findings show that the most common reason for a return to education was a lack of opportunity at the earlier age to carry on their studies [6]. Other reasons stated (i.e. in [7]) are "Fulfil my ideals and personal goals", "Ensure my survival, get the paid job" among others [8]. This indicates that personal and professional interests are leading these students and provide them with motivation for their studies.

Mature students who come to study can be subdivided into two groups: students who have working experience in the subject of their education (i.e. acoustics) or those new to the subject. In this article, the focus will be on students with working experience in acoustics as a subject (although the author has also been working with students whose interest of acoustics was through hobby, rather than work).

Support from the workplace could become a key reason for embarking on the education process. It is extremely difficult to study without allocated time and in some cases, cost coverage, as well asan additional motivational support. It should be a joined decision, as it may be beneficial not only to the individual workers, but to the organisation as well, as they will get in return a person who has deep knowledge of the scientific processes as well as existing working experience. Upon graduation, they will be able to apply this newly received knowledge to their day-to-day work, use it in problem solving, or be promoted to higher specialist or managing roles.

3. WHO ARE THE MATURE STUDENTS WITH EXPERIENCE?

Traditional and non-traditional routes to higher education in UK were discussed in [9]. The summary of both routes is shown in Figure 2.

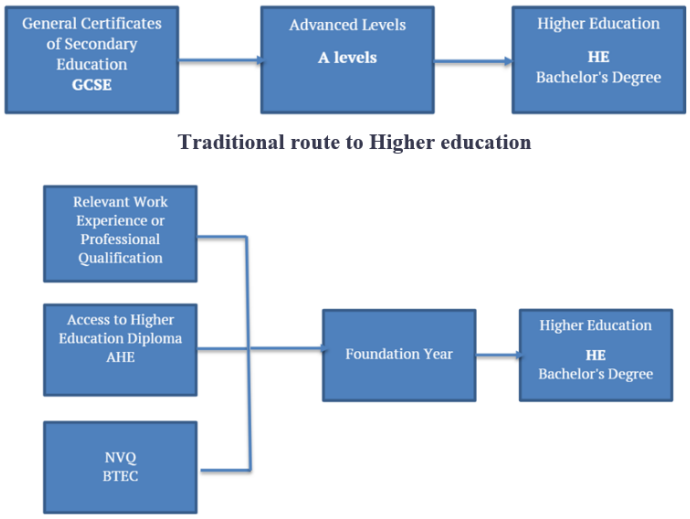

Figure 2. Traditional and non-traditional routes to Higher Education

Students with working experience in the subject of acoustics could be divided into three groups: students with previous education on the subject (i.e. with near-completed initial degree, or those who received only certificate of qualification), students with previous education on a different subject (examples known are students with degree in Physics, Mechanical Engineering, Art, Languages), and students with no previous educational experience (who went straight to workplace after leaving school).

The first group already has the initial basic scientific structure learnt and knows how to explain some of the effects they come across in their day-to-day work, and, even more importantly, they have embedded the main principles of how to study – how to focus, read articles, analyse, apply formulas, write reports, and other essentials of the learning process.

The second group is also familiar with the principles of studying, literature reviewing, sometimes formulas and report writing – although applicable to a different subject. However, adjusting those methods and principles to the new subject and getting into the learning process quicker should not be too difficult for this group.

The last group with just working experience, may need extra support at the beginning of their study. This group could have quite significant experience background (especially for those with 10+ years of working), however they have the need to structure their experience and understand the principles behind the working processes and routines. This could be studied individually or with support of the tutor.

The OU students in the surveys and case studies published in [4], mention that at the moment of re-starting the higher education the knowledge gaps in material learned at school or in the first degree could be very significant. It is widely recommended for students who had completed their studies a long time ago or left school without further qualifications to sit through foundation subject courses, which help to get up to speed with the subject they are planning to study.

According to Institute of Acoustics Diploma website [5], the students are required to “understand Decibels, able to use formulas from Calculus, etc”. Many students highlighted that their confidence had improved after completing the first year of study and praised the support from the associate lecturers [4].

4. VARIABILITY WITHIN THE STUDENT GROUP

The Institute of Acoustics' Diploma in Acoustics and Noise Control has been running since 1975. It is usually studied on a part-time basis, over a little more than one year. The course includes General Principles of Acoustics, assignments, two specialist modules (of the student's choice from Environmental Noise, Noise and Vibration Engineering, Building Acoustics and Regulations and Assessment of Noise), examination and Diploma Project.

It had been experienced when teaching at the Institute of Acoustics Diploma course [5] that within the student group, their experience could vary quite significantly. The diversity of knowledge within a single group generates some uncertainty for the lecturer regarding how to deliver the material to everyone in the same course. At the beginning of the course the lecturer usually introduces themselves and asks the students about their experience to understand the spectrum of knowledge within the group, and as a result alters, where possible, their lecture material.

The students with experience are likely to ask questions based on their existing knowledge, and they expect the lecturer to be able to answer them. The lecturer cannot have knowledge of every industry related to the subject. It would be practical to have the list of interests and expertise or pre-existing knowledge of the students provided from the HE institution in advance, which would give the lecturer the opportunity to tailor the material before the course' start and allow to prepare some specific examples related to that experience in order to fulfil the group needs and interests.

Nevertheless, it is essential for the lecturer delivering the material to mature students to understand and be able to reflect on the needs of the industry representatives among the students with examples or explanations of various engineering problems or aspects that may occur. The lecturer ideally should have broad knowledge of the adjacent disciplines and should be flexible in finding ways to learn or find information to satisfy their students' needs without compromising the teaching of the core material.

When teaching the subject, the lecturer should select examples that are clear to understand by everyone in the group (common knowledge examples, or typical examples from day-to-day use), and also try to include some examples related to the individuals. By working through these latter examples, the lecturer could create the inclusion effect for individuals and additionally widen the knowledge of the entire group on the subjects only known by some of them (see some examples discussed in [10]).

Working in groups and individually are the other skills which require development for all groups of students. This depends not only on students' knowledge, but also on their personalities, their presentation skills, previous experience of doing such work, especially if it was unpleasant before.

The lecturer or tutor should be able to manage different needs of students carefully when asking them to do this type of work. The diploma project or coursework marked assessments must be individual
work.

5. TIMING PROBLEM FOR EDUCATING AT DISTANCE LEARNING COURSES

As most of the distance learning or compressed hours' courses require presence of the students in the classrooms only for one week (or one day of the week/ month), a large part of the education process falls on working independently. If the students are working individually, they are likely to refer back to their tutor with questions or queries.

The tutors who teach distance learning and compressed-hours courses must understand when and how their students are studying. It is very typical that the students study over weekends, public holidays, and take annual leave at their work to do intensive study. It is essential for these students to be supported by their companies to allow them to take holidays flexibly. It would be normal to expect that there will be more contacts, questions and queries closer to the deadline dates for submission of coursework or diploma, or closer to exams.

The lecturers may need to make adjustments to their working plans to accommodate the time to support their students. Every lecturer or tutor who works with the distance learning students has to be also flexible (within reason) to allow the learning process for students to be as smooth as possible.

Any planned holidays taken by the lecturers should be announced to the students well in advance with indication, if they can or cannot be contacted. The lecturers and students should work together to allow the best flexibility of the contact process without too many compromises and sacrifices from both sides. The working schedule and the preferable ways of how the lecturer and student can be contacted should be agreed and "signed off" at the beginning of the course to avoid misunderstanding and complaints in the future.

6. CONCLUSIONS

Giving mature students the ability to study is very important for the academic institutions and for the students themselves to succeed in their chosen careers. The tailored approach to the students' individual skills and knowledge is essential. The lecturer or the diploma project supervisor should continuously improve their understanding of the subject in relation to the industry needs and day-to-day life issues. This constantly growing knowledge should help the lecturer to be able to master the course's flexibility, create a supportive environment for the students, and help them to develop and refine their self-study skills.

The students and the lecturer should work together on the educational process to make it a successful and positive experience.

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