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The Relationship Between Vocational & Higher Education: Time For A Re-Charge?

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THE RELATIONSHIP BETWEEN VOCATIONAL & HIGHER EDUCATION: TIME FOR A RE-CHARGE?

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ABSTRACT

In both the UK and EU there is a growing awareness of the need for Higher and Further Education (HEIs / FEIs) institutions to work together to provide high quality engineering courses able to meet the needs of an increasingly technical and knowledge-based economy (Barrichello et al., 2020, Giraldo, 2022). This paper focuses on learning and teaching in one particular engineering area, that of '*electrification'*, it reflects upon moves to create a regional multi-level educational strategy built upon the development of expertise at partner FEIs.

As one of the UK's leading Engineering Education providers at tertiary level, WMG is leading this boundary-crossing project. An Action Research approach has been developed that transcends organisational competitiveness by creating a multi-level approach to the provision of electrification skills amongst the population of the West Midlands.

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Four different project objectives have been developed:

1. Analyse stakeholder need from the perspective of employers, students and colleges.
2. Analyse extant provision per FEI in terms of physical and human resources
3. Identify any gaps in provision of training available within the region.
4. Develop a plan for the establishment of Centres of Excellence across the region.

This paper discusses the need for synergising provision within what is very much a Quasi Market (Donovan, 2019). It suggests that rather than compete with each other, FEIs need to be working together, and in partnership with HE, create high quality, industry driven and cohesive regional provision. In an emerging field such as 'electrification' (of transport and in terms of new battery technologies), the need for regional focus and expert leadership has become increasingly important.

1. INTRODUCTION & BACKGROUND

Following Brexit, longstanding concerns regarding skills shortages in engineering in both the UK and EU has resulted in a growing need for the University, Vocational and Further Educations sectors to work together to provide high quality engineering courses able to meet the needs of an increasingly technical and knowledge-based economy (Barrichello et al., 2020, Giraldo, 2022). This concept paper, which is written at the very early stages of the project, begins by looking at moves by the UK government to begin to address UK engineering skills shortages. It continues by describing how one University, in collaboration with local Further Education providers (Vocational Education & Training), is planning to assure that the F.E. Sector in the West Midlands Region has the capacity to provide sufficient numbers of skilled engineers equipped to work in the 'electrification' sector.

One of the keyways in which skills shortages are being addressed within the UK, both in the engineering sector, but also much wider, is through a recent *reinvigoration* of traditional style apprenticeships. Funded through a range of industrial taxes, level three and level four apprenticeships are offered by F.E. colleges, often in partnership with universities. Generally aimed at those over 16 years, apprenticeships provide a direct route into either employment or university. Students study for a level three and or a level four qualification spending most of their time in work.

In the UK. the term apprenticeship represents a formal period of training which lasts between 1 and 5 years, depending on the level of study. There are four levels of apprenticeship, each equivalent to a recognised UK education level; these are:

- Intermediate Apprenticeships (Level 2: Equivalent to GCSE [General Certificate of School Education]).
- Advanced Apprenticeships (Level 3: Equivalent to GCE 'A' levels [General Certificate of Education, Advanced]).

- Higher Apprenticeships (Levels 4, 5, 6, and 7: Equivalent to Foundation Degree and above).
- Degree Apprenticeships (Levels 6 and 7: Bachelor's or Master's Degree). **(Gov.UK, 2023)**

Table 1 shows the numbers of students enrolled in STEM apprenticeship programmes over a four-year period (as well as depicting those enrolled in a business, admin and law apprenticeship). It should be noted that it is not possible to access more focused data on gender, ethnicity or previous education of students.

Table 1: Apprentices Enrolled in Engineering & Associated Subjects – 2018/19-2021/22 (Gov.UK.2023a)

Year	**2018/19**		**2019/20**		**2020/21**		**2021/22**	
Subject	*N*	*%**	*N*	*%*	*N*	*%*	*N*	*%*
Business, Administration & Law	118,600	30.2	94,400	29.3	95,900	29.8	93,900	26.9
Construction, Planning & Built Environment	22,500	5.7	21,900	6.8	20,000	6.2	26,100	7.5
Engineering and Manufacturing Technologies	60,000	15.2	52,000	16.1	39,500	12.3	49,100	14
ICT	21,100	5.4	18,200	5.7	18,400	5.7	22,800	6.5
Science & Maths	100	-	200	-	200	-	400	-

** The % Table depicts the percentage of apprentices enrolled in the subject as against the sum of all those enrolled on apprenticeship programmes (when n = 100)*

When considering the need for Further Education to provide skills training for the Engineering Sector, Table 1 reveals a concerning picture, showing that there are twice as many business apprentices as there are those enrolled on engineering and manufacturing courses (Gov.UK, 2023). Furthermore, in the ICT and Construction Sectors the situation is even more dire, with only 6.5% and 7.5% respectively of all student apprentices working and studying in these areas.

Whilst apprenticeships are perceived to be aimed at young people, other training has recently become available for adults. A new government "Skills for Jobs" initiative launched April (2021) aimed to provide adult learners, aged 19 and over, with the opportunity to study for a level 3 qualification in a subject that would equip them with the skills employers' are seeking, thereby enhancing individual job prospects (Dept. of Education, 2021). This initiative provides free training in a number of different areas where there are national skills shortages. It targets those in receipt of unemployment benefit and promises a level 3 qualification and route into employment.

Unfortunately, as detailed in Table 2 below, the success of this initiative is somewhat debatable, although those training in construction, planning and the built environment

are twice as likely to succeed than those training within the business area. Interestingly, a cross tabulation of the data revealed a 'gender attainment gap' in four of the five areas examined; with male students between 5-16% more likely to succeed and pass the course than female students.

Table 2: Adult Education: Skills for Jobs (Students Aged 19+ Studying Level 3 Engineering & Related Topics at Further Education: 2021 / 2022) (Gov.UK.2023b)

Subject	Enrolments			Successful completions & graduation			Percentage of students succeeding**			M/ F Attainment Gap***
	All	F	M	All	F	M	All	F	M	
Business, Administration & Law	6290	4610	1680	1410	980	430	22%	21%	26%	5%
Construction, Planning & Built Environment	4430	170	4260	1810	50	1760	41%	29%	41%	12%
Engineering and Manufacturing Technologies	2060	170	1890	690	40	659	33%	24%	35%	11%
ICT	2480	910	1570	900	290	610	36%	23%	39%	16%
Science and Maths	230	150	80	30	20	10	13%	13%	13%	0

***The percentage of students succeeding is shown within the subject area.*
****The M/F attainment gap refers to the percentage difference between genders of those who succeed and complete the course.*

Having briefly examined the background of training in the F.E. Sector in the UK, the following paragraphs provide a brief insight into a regional initiative aimed at addressing skills shortages in the engineering electrification sector. It is important to note that the project is very much in it's infancy. It is acknowledged that there is much work to be done including a wider literature review of the extant literature pertaining to collaborative working between H.E. and F.E.

2. ELECTRIFICATION IN THE WEST MIDLANDS: PROJECT OBJECTIVES

The overarching objective of the project is to prepare the West Midlands Region to react effectively to the changing market demands that electrification is presenting as society moves towards more sustainable technology. The project aims to promote collaborative working between H.E. and F.E. Institutions within the West Midlands. It will ensure that learners are able to access education and training opportunities that will lead to employment, whilst also ensuring that the West Midlands region remains an attractive prospect for inwards investment.

One of the key drivers for the project is the West Midlands Combined Authority (WMCA) which has identified transport and energy as key strategic sectors for the region. This is reflected in the Local Skills Improvement plan. Much of the responsibility for providing education and training will fall on the Further Education sector with c80-

85% of roles requiring training to levels that FE specialise in (this Table is based on the proportion of electrification roles employed with levels of education congruent with FE College delivery. Ensuring that Colleges are prepared to respond to this demand through sufficient capital and operational funding will be critical to the future success of the region.

The project will also drive F.E. Colleges to collaborate more closely with each other together than previously. Whilst numerous previous capital projects have required a level of such collaboration across the F.E. Sector, colleges are necessarily isolationist in a lot of their provision (something which is necessary to maintain competitive advantage within the QUASI market that is the UK F.E. Sector). Taking a regional view exposes the types of skills provision where duplication can readily be supported as the market is big enough.

Colleges West Midlands suggest that at lower levels, college learners are less likely to travel beyond their immediate locality, whilst for more specialist, and higher-level courses, learners are more prepared to travel at further. To avoid future duplication of provision, a wider view needs to be taken to ensure that specialist provision can be accessed with the region. Collaboration across the F.E. Sector will involve the sharing of human and physical resources as well as intellectual property. There is also a need for an institution to take a leadership role, which is where WMG, University of Warwick will step in.

2.1 The 'Market'

Most providers in the region are focused on providing skills for EV servicing. This is in response to the most visible, and clearly defined, need within the current market. However, a wider strategic view of the demands that electrification will bring demonstrates that a focus on the underpinning technologies associated with electrification is also needed. This will enable providers to react more effectively to industrial needs and in doing so expand provision beyond the EV market.

Developing specialisms in batteries, motors, power electronics, robotics and software and hardware engineering, amongst other technologies, will help to secure the region's emerging skills requirements.

3. DISCUSSION: THE CHALLENGES OF COLLABORATIVE WORKING IN WEST MIDLANDS FURTHER EDUCATION SECTOR.

The first phase of the project requires that the WMCA be presented with capital and operational strategic plans to be implemented from the 2023/24 year. The regional approach to capital requests covers a range of different areas such as funding for public engagement and staff. It also identifies four challenges of collaborative working that the project seeks to address. Each of these is now discussed.

3.1 Stakeholder Analysis: What do employers, students, colleges and WMCA want the F.E. Sector to Provide?

Due to their close links with the communities serve, F.E. Colleges are best placed to understand, interpret and react to stakeholder needs. Provision within the F.E. Sector tends to be demand driven and requires a proven market need before courses are made available. However, work undertaken as part of the National Electrification Skills Framework has shown that many employers are not clear about what is required and therefore any skills- needs analysis should look both at the potential for stimulating the market as well as the ability to react to it.

Whilst there is some interest being shown by students themselves in electrification, most young people are unaware of the employment opportunities a career in engineering is likely to offer. To address this there is a need to raise awareness of engineering much earlier in the education journey. One of the key aims of this project will be to establish the means to engage with the Schools Sector, raising awareness of engineering in general and the opportunities training in 'electrification' may bring in particular.

Colleges themselves are key stakeholders in this process and it will be critical to understand the level of engagement they wish to have with a regional strategy. With each college acting as an independent business there are pressures to ensure that they remain individually viable whilst also exploring collaboration. There is precedent for collaboration as seen in requirements for funding which stipulate that bids need to be carried out as part of consortia to limit the dilution of funding. However, where there is duplication of provision there will be natural competition between colleges. This project will take account of this nuanced relationship and identify where duplication of provision, and hence competition, is beneficial to the overall skills landscape. In such cases the project will highlight where collaboration could prove to be the most effective way of ensuring that the region has the educational support and backing it requires.

Finally, the combined authority itself is also a key stakeholder in this initiative. The overall competitiveness, and therefore success in attracting and retaining investment, is critical to the growth of the region. A strong F.E. sector that can provide the skills environment to attract, and retain, employers engaged in electrification will be critical. This stakeholder interest will be realised in the investment provided as a result of the initial report outcomes.

3.2 Identify Extant Provision Per F.E.I. in terms of Physical and Human Resources

There are three key components to this objective, the analysis of current and future planned capital expenditure, the current curriculum, and current human resources. Understanding these in the context of one another, allows for the establishment of current capability and capacity across the region so that planned growth and the ability to deliver against ambition can be realised.

There are a range of physical resources across the region relating to electrification, most of which currently focus on EV servicing and repair. There are also other assets, allowing for delivery of courses to drive capability in other transcendent (e.g., digital) technologies, which are not as immediately apparent. Understanding the extent of physical resource will speak to the current capacity to deliver against electrification competencies. An analysis of current provision will also enable a map of resources to be created to show gaps in coverage that need to be addressed. It is also important to understand planned expansion of facilities as this will inform the potential to grow provision as well as demonstrate capacity growth to WMCA.

Linked to physical resources, is the curriculum. Understanding the scope of provision across the region, as well as planned growth, will enable gaps in academic and skills training provision to be mapped out, and opportunities to be identified for new courses to be developed. Such an analysis will also highlight where employer needs are being met. From the WMCA perspective, understanding the potential capability that will be delivered in the future will allow for speculation around inward investment.

Finally, human resources represent the most critical part of this objective. One of the core driving factors that has influenced the overall strategy is that it has proved to be challenging to ensure that F.E. colleges have the appropriate capability to deliver the required courses. Another challenge represents FEIs' ability to attract, recruit and retain future engineering talent. Without this there is little point in investing in facilities or planning new curriculum. Understanding the status of human resource will enable development plans to be implemented to ensure staff receive appropriate training in line with curriculum growth and that other methods of ensuring that there is sufficient coverage, such as industry secondment, can be explored in conjunction with WMCA.

3.3 Identify Gaps in Training Provision across the Region.

The first two objectives will help to identify current gaps in the provision on offer and enable strategic investment to be made to ensure that facilities, human resources and accredited and approved engineering curricular are in place to meet need. Closing the gap in training provision will also highlight opportunities to attract new investment into the region where the skills environment is present.

The identification of gaps also links closely to analysing where provision can be duplicated and where specialist provision needs to be located. It is suspected that some gaps in provision will be as a result of individual colleges being unable to make a successful business case for the provision of a particular course based on low demand. In these cases, gaps may be closed through collaboration where low numbers can be combined. In addition, there is a case to look at specialisations where colleges who are focused on key technologies will be able to create focal points and close gaps through engagement and collaboration.

Critically, the speed of the way that the electrification landscape is changing means that there will always be gaps opening and closing. The ability of colleges, through their physical and human resources, to adjust and evolve the curriculum will be key in meeting this challenge. When considering capital, and operational, investment there will be a need to engage with organisations, such as the UK Foresighting Hub, to continually look to the future of capability need.

3.4 Develop a Plan for the Establishment of Centres of Excellence Across the Region

When focusing on electrification the decision has been made not to focus on traditional sectors but to focus on enabling technologies. These are termed as transcendent technologies due to their role in transcending the sectors in which they are applied. Whilst sector applications will drive much of the curriculum in the region, e.g., servicing of EV which encompasses a number of the transcendent technologies applied in an automotive context, there is value in having centres that provide focal points in the specific technologies themselves.

In putting the strategy together, the need to establish centres of excellence across the region has become evident. Individual colleges specialising in different skills provision and training need to work together to establish a network of provision purposefully focused on addressing the needs of regional industry. Having such focal points will provide two key advantages. Firstly, where there are gaps in curriculum caused by low student numbers across different providers, centres of excellence can enable viable provision to take place. As such they can address niche requirements across the region in a strategic way bringing students together to study in a particular area. Such centres of excellence will also provide regional leadership in their respective technologies, supporting other providers in areas of best practice.

The ‘Centres of Excellence Model’ is untested in Further Education and will require further analysis to establish its viability, but there are already examples of providers across the region that could take on this role for specific technology domains. The main challenge likely to be faced in developing the strategy is the willingness of individual F.E.I.s to engage in a collaborative manner to ensure regional success. The idea of Centres of Excellent is, at this moment in time, aspirational but it is envisaged that as the project moves forward the synergetic value that specialisation and collaboration can bring to the region will become a reality.

4. CONCLUDING REMARKS

This brief conceptual paper has set out four challenges faced by West Midlands F.E. Education Sector in developing a strategy for collaborative working so as to meet the future needs in the area of ‘electrification’. The role of the WMG, University of Warwick, in this strategy is one of facilitation and leadership, bringing the partners together, writing the WMCA funding bid and acting as a central hub where organisational difficulties and challenges may begin to be addressed.

In conclusion, this project is very much in its early stages. Discussions between the University and local F.E. colleges have promoted a positive response, boding well for the future. Yet much of the detail remains undecided. The presentation accompanying this paper will report on progress, outlining future plans for collaborative working and identifying the challenges faced and overcome. It is anticipated that, by the time of the conference, the regional strategy discussed here will have become a reality. Plans for 'Regional F.E. Centres of Excellence' will hopefully be well underway and many more opportunities will be opening up for next year's cohort of future engineers. Watch this space. The future promises to be exciting!

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