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Process evaluation of the Long Latency Health Risks Division (LLHRD) vocational training interventions

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Research Report

HSE

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Process evaluation of the Long Latency Health Risks Division (LLHRD) vocational training interventions

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Three vocational education and training-based (VET) learning products/materials were developed in order to raise awareness of long latency respiratory health risks in three of the high risk vocational areas affected by these issues: motor vehicle repair, welding and stone masonry. The aims of the study were to explore how the VET materials can be implemented, and the perceived effectiveness of the implementation from the perspectives of students/young learners and their teachers and identify the factors that promote and/or inhibit learners' application of their training in the workplace

There was a prevalent perception, among both students and their teachers, that the HSE vocational education training (VET) materials were both relevant to the young learners' respective professions, and helped to raise awareness regarding the nature of respiratory health risks, their potential short and long-term health effects and the ways in which learners can protect their health. The VET materials complemented the colleges' existing curriculum, as in most cases, respiratory health risks were not covered in sufficient detail in the syllabus. Teachers commented that they would use the VET materials again with future student cohorts, and that they would recommend them to their colleagues and/or other teachers.

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KEY MESSAGES

- There was a prevalent perception, among both students and their teachers, that the HSE vocational education training (VET) materials were both relevant to the young learners' respective professions, and helped to raise awareness regarding the nature of respiratory health risks, their potential short and long-term health effects and the ways in which learners can protect their health.

- The VET materials complemented the colleges' existing curriculum, as in most cases, respiratory health risks were not covered in sufficient detail in the syllabus.

- The inclusion of personal examples or testimonies was perceived as a 'powerful' means of conveying information about respiratory health risks.

- Students showed a stronger preference for information that was presented visually, mixing 'theory' with practice (through the use of learning activities, and practical demonstrations). Communicating messages by illustrating their practical relevance helped to promote young learners' awareness regarding the risks that are not 'visible' and whose effects may take time to develop.

- Focusing on work environment factors, such as peer and supervisory behaviours, organisational support and prioritisation of safety could help promote learning transfer in the workplace.

- Teachers commented that they would use the VET materials again with future student cohorts, and that they would recommend them to their colleagues and/or other teachers.

- Among young learners, there were some who reported changes in their risk perception (that were retained at the follow-up period of at least three months) and the practices adopted in the workplace following the VET lesson; changes in work practices included more frequent use of respiratory protective equipment particularly for prolonged tasks. In addition, welding students expressed raised awareness of the importance of the correct use of Local Exhaust Ventilation equipment.

- Factors that were perceived as promoting the application of practices from the college to the work environment included the resources invested in health and safety, provision of training (particularly in the use and maintenance of both personal and respiratory protective equipment), supervisory support and behaviours (e.g. 'modelling' safe practices, reprimanding unsafe practices), and communication of health and safety.

- The main barriers to the application of knowledge and safe practices learnt at college to the workplace included peer behaviours (particularly 'picking up bad habits' from older workers), employers' levels of awareness regarding respiratory health risks, and young learners' own risk perception.

EXECUTIVE SUMMARY

1 BACKGROUND

The Health and Safety Executive's (HSE) Long Latency Health Risks Division (LLHRD) has developed three vocational education and training-based (VET) learning products/materials in order to raise awareness of long latency respiratory health risks in three of the high risk vocational areas affected by these issues: motor vehicle repair, welding and stone masonry. The aims of this study focused on i) exploring how the VET materials can be implemented, and the perceived effectiveness of the implementation from the perspectives of students/young learners and their teachers, and ii) identify the factors that promote and/or inhibit learners' application of their training in the workplace.

2 METHODOLOGY

During the first phase of the research, eight colleges delivered a lesson on respiratory health risks using HSE's VET materials. To help support teachers with the implementation of the materials, they were provided with a lesson plan, which consisted of three components: a PowerPoint presentation, a video and a learning activity. Following the delivery of the lesson, a total of twenty-nine interviews were carried out with teachers and students to explore their experiences of the content and implementation of the VET materials. For the second phase of the study, a total of fourteen interviews were conducted with students that took part in the first phase of the research and their supervisors in order to explore the factors that may influence the on-the-job application of the knowledge that students gained from the lesson. The qualitative data was analysed thematically, identifying recurrent themes as well as any differences across participants.

3 PHASE 1 RESEARCH FINDINGS

The findings suggest that the HSE's VET materials were perceived to be effective in terms of raising awareness of respiratory health risks and the different types of controls available to young learners for protecting their health.

3.1 PERCEIVED EFFECTIVENESS OF IMPLEMENTATION

Students showed a stronger preference for information that was presented visually. For instance, the video was most commonly referred to as the element of the lesson enjoyed the most whilst the key messages from the video were also mentioned in the follow-up interviews suggesting that the information had 'stayed' with the students. Further, there was a perception that the learning activities had promoted both the application and consolidation of the information gained from the lesson. The use of learning activities also added an interactive component to the lesson, which had reportedly improved students' engagement. Combining theory with practice and communicating health and safety messages by teachers who are perceived as knowledgeable of the practical realities of the job was also crucial in promoting student engagement. The length of the lesson varied considerably across the different colleges and, as a consequence, it was not possible to ascertain whether there was an 'optimum' lesson duration.

Implementation of VET materials

Teachers used their discretion in tailoring the materials to ensure that the lesson was appropriate to their students' needs. There were some variations in how the lesson was taught in terms of the number of learning activities incorporated in the lesson (with some colleges opting to use more than one), and how they were implemented (e.g. used both pre and post the lesson to assess learners' knowledge), for example. In some cases, additional materials were incorporated (i.e. videos) in order to enhance key messages on respiratory health risks.

Teaching approach

An interactive approach was the preferred mode of teaching across the colleges. This involved group discussions, encouraging students to ask questions throughout the lesson and inviting them to relate their own experiences from the workplace to the issues discussed. In order to ensure that health and safety messages had a 'strong impact' on young learners, teachers provided examples from their own industry experience, for instance by relating stories about individuals that had suffered from poor respiratory health. Further, health and safety messages were tailored by providing examples that would be easy for the students to relate to (e.g. drawing similarities between smoking and the amount of fumes that they could potentially inhale). A practical understanding of respiratory health risks was also promoted by demonstrating key issues at the workshop.

3.2 LEARNERS' REACTIONS TO THE VET MATERIALS

Knowledge of long-latency diseases

Young learners self-reported understanding regarding the effects of exposure to dust or fumes varied, and appeared to range from having a basic understanding to having no awareness of the potential health effects. The prevalent view among students was that the lesson had increased their knowledge regarding the range of potential negative health effects. Further, there was an appreciation that these effects could be cumulative and take time to develop. The predominant perception among teachers was that the lesson had increased young learners' awareness of long-latency diseases. It was commonly described that students reacted with 'fear' or 'surprise' in response to the potential long-term effects on their health.

Understanding of risks and controls

Young learners' self-reported awareness of the respiratory health risks prior to the lesson was variable whereby some acknowledged that prior to the lesson they had been completely unaware of the risks that they were exposed to. The prevalent view among both the teachers and the students was that the lesson had increased students' awareness of how exposure to harmful substances could affect their health and had promoted a more nuanced understanding that exposure to potential respiratory health risks may be heightened depending on the type of activity and/or materials used. The lesson had reportedly provided young learners with a better appreciation of the different types of controls available to protect their health. In one welding college, improved practices were observed following the lesson in terms of how the local exhaust ventilation equipment was used.

3.3 PERCEIVED CONFIDENCE IN KNOWLEDGE RETENTION

Young learners expressed confidence in remembering the key messages from the lesson, particularly those that were presented visually (i.e. the amount of fumes or dust inhaled as shown on the video) and the long-term effects of exposure to respiratory health risks. This information was also recalled in the follow-up interviews with the young learners that took place a minimum of three months after the lesson. Teachers reiterated the importance of refreshing the lesson to optimise knowledge retention, and reinforcing the use of controls (such as masks) during practical activities at college.

3.4 SUGGESTIONS FOR IMPROVING THE VET MATERIALS

The prevalent view among the teachers was that the VET materials were easy to use, and that the content was relevant to the students' respective vocational areas. The teachers also discussed plans for using the materials with their future student cohorts. Suggestions regarding how the VET materials could be improved focused on both the content (e.g. including testimonies from individuals suffering from poor respiratory health, more information on PPE/RPE and use of power tools on site), and the use of visual information (e.g. images of different diseases, inclusion of videos in 'real world' settings).

4 PHASE 2 RESEARCH FINDINGS

4.1 SELF-REPORTED CHANGE IN ATTITUDES AND PRACTICES

There were examples of self-reported changes among students in terms of their risk perception and the practices adopted in the workplace. An improved risk perception appears to have partly stemmed from an appreciation of the risks associated with exposure to harmful substances, and a realisation of the necessity of using PPE and RPE to protect one's health. Examples of improved practices at the workplace included more frequent RPE use, using better quality masks, and requesting dust suppression equipment. However, the students' self-reported changes in work practices were not corroborated by their supervisors. One possible reason for this discrepancy might be that the supervisors had limited opportunities to observe the young learners' practices, and/or apprentices spent more time working alongside experienced colleagues other than their supervisors.

4.2 FACTORS INFLUENCING LEARNING TRANSFER IN THE WORKPLACE

Factors that were perceived as promoting the application of practices from the college to the work environment included company size and the resources invested in health and safety (e.g. larger organisations investing in better quality equipment), provision of training (particularly in the use and maintenance of PPE and RPE), supervisory support and behaviours (e.g. 'modelling' safe practices, reprimanding unsafe practices), and communication of health and safety. Factors that were perceived as inhibiting the use of safe working practices included: peer behaviours (particularly 'picking up bad habits' from older workers), employers' levels of awareness regarding respiratory health risks, and young learners' risk perception. Suggestions for overcoming potential barriers to learning transfer included challenging older workers' practices, having frequent safety communications, ensuring that health and safety messages are simple (i.e. do not use technical terms) and are communicated through channels which are most accessible to young learners (i.e. portable technology), and raising employers' awareness about respiratory health risks.

4.3 IMPLICATIONS

The findings of this study can help inform the communication of respiratory health risks and long-latency diseases to young learners, and the implementation of similar VET materials. The use of visual information, a focus on active learning, and tailoring messages to young learners' experiences in the workplace could all contribute to the effective communication and retention of information on respiratory health risks and their effects on health. Considering the stage at which young learners (both in terms of their college training and work experience) might be more receptive to health and safety messages might also be fruitful. Focusing on work environment factors, such as peer and supervisory behaviours, organisational support and prioritisation of safety could help promote learning transfer in the workplace. The importance of considering these factors is also supported by both theoretical models of learning transfer and empirical literature.

5 CONCLUSION

Overall, the prevalent view among both young learners and their teachers was that the VET materials had increased learners' knowledge of the risks that they were exposed to in their respective vocations, and of the range of respiratory health illnesses that could result from breathing in harmful substances. Further, there was an appreciation among young learners that these effects could be cumulative and take time to develop, as well as a heightened awareness of the importance of using the necessary controls to protect their health. Consistent with this, the findings revealed several examples of self-reported changes among students in terms of their risk perception and the practices adopted both at college and in the workplace.

There are several factors to consider in the implementation of VET materials designed to promote awareness among young learners regarding respiratory health risks, as well as health and safety messages more broadly. Specifically, the use of visual information that is linked to learners' experiences and the practical realities of their job may be particularly important for raising awareness regarding risks that are 'not visible' and whose effects may take time to develop. Further, there was a perception that active learning promotes the application and consolidation of young learners' knowledge, whilst the inclusion of personal examples or testimonies was perceived as a 'powerful' means of conveying information about respiratory health risks. The findings also highlight the importance of reinforcing respiratory health messages and positive practices both at college and in the workplace. The factors identified as potentially influencing knowledge transfer in the workplace included organisational support and the amount of resources invested in health and safety, and peer as well as supervisory behaviours.

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1. INTRODUCTION

1.1 BACKGROUND

The Health and Safety Executive's (HSE) Long Latency Health Risks Division (LLHRD) has developed three Vocational Education and Training (VET) based learning products, with an external agency, to raise awareness of long latency[1] respiratory health (LLRH) risks in three of the high risk vocational areas affected by these issues: motor vehicle repair, welding and stone masonry. The aim of these products is to raise learners' awareness of the long-term respiratory health risks associated with their chosen industry and the ways in which they can avoid or reduce them. In order to achieve this, tutors need to be supported by providing them with engaging source material and advice on how this might be presented and incorporated into their teaching sessions.

A usability assessment of the VET learning products was carried out to ensure that they were relevant and understandable for the target audience. Beyond the face validity of the materials, an understanding is needed regarding the facilitators and barriers to learning and implementation of the training materials. This will inform HSE regarding the factors that contribute to the success or failure of these learning products and ways in which implementation may be optimised.

1.2 RESEARCH AIMS AND OBJECTIVES

The aims of the research are to:

1. Explore how the HSE's VET materials were implemented and the perceived effectiveness of the implementation from the perspectives of students and teachers, and

2. Identify the factors that promote and inhibit learners' application of their training in the workplace.

The objectives of the research are to:

- Explore students' experiences of the VET materials with respect to their implementation (e.g. delivery/teaching method, length of exposure to training materials) and content and identify which aspects of the training are viewed as working well and less well.

- Explore teachers' views on the implementation of the training materials, factors that influenced the way that the materials were taught (e.g. in terms of length of exposure, teaching methods) as well as factors that inhibited or facilitated their effectiveness.

- Identify the factors that influence the 'on the job' application of the learning obtained from the three different learning product areas from the perspectives of college students who are on their work placements and their supervisors.

- Provide suggestions to HSE on how the implementation of the VET learning materials and learning transfer can be improved.

[1] Long-latency diseases are conditions that take time to develop and manifest themselves a considerable time after exposure to the agents or substances that caused them (HSE, 2012. Work-related respiratory disease, accessed from http://www.hse.gov.uk/statistics/causdis/respiratory-diseases.pdf)
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2. METHODOLOGY

2.1 SEMI-STRUCTURED INTERVIEWS

A qualitative approach using semi-structured interviews was used to address the research aims outlined above. Semi-structured interviews were particularly well suited for this research as they combine structure with flexibility, thus allowing the researcher to be responsive to what the interviewee is expressing and to probe him/her further. In addition, the richness of information derived from qualitative methods are pertinent for process evaluation[2] as they provide in depth information on how well interventions are implemented as well as their strengths, weaknesses and areas for improvement.

2.2 PARTICIPANTS AND PROCEDURES

2.2.1 Recruitment of colleges

A purposive sampling approach was used to recruit colleges for the study. This approach focuses on particular characteristics of a population that are of interest and can best address the research questions (Ritchie and Lewis, 2003). A key criterion for this study was the vocational subject area as the VET materials were targeted specifically at the motor vehicle repair, welding and stone working areas. Another criterion for participation was that colleges should be able to implement the materials with their first year students. The rationale for this criterion is that the timing of communicating health and safety messages is important whereby young learners are more receptive to such messages at the initial stages of their training (Mowlam, Mitchell, Jones, and Ludford, 2010). In consultation with HSE, it was agreed that a total of nine colleges should be included in the study (three colleges for each vocational area).

The HSE provided the researchers with the contact details of nine colleges that had taken part in an earlier pilot study of the VET materials. The relevant teachers in each of these colleges were provided with information regarding the study and were asked if they would be interested in taking part in the evaluation. From those colleges that were initially approached, five agreed to take part. For the second recruitment round, the HSE provided the researchers with the contact details of an additional eleven colleges, which had not taken part in the initial pilot study. From those, two additional colleges agreed to take part. The remaining two colleges were recruited opportunistically by identifying colleges that provided relevant courses through the internet. During the course of the research one college had to withdraw its participation because it had not been possible to implement the VET materials within its existing curriculum for the academic year. This resulted in a total of eight colleges taking part in the evaluation. Of these, three were welding colleges, two were motor vehicle repair colleges and three were stone masonry colleges.

2.2.2 Implementation of VET materials

The VET materials were implemented across the eight colleges between May and December 2012. All colleges were sent a DVD that contained all the learning resources that would be required by the teachers in order to teach the lesson on respiratory health risks in their respective

[2] Process evaluation involves assessing whether and how an intervention or programme works and understanding the relationship between specific elements and intervention outcomes (e.g. the factors associated with the success and/or failure of an intervention) (Saunders, R. P., Evans, M. H., and Joshi, P. 2005. Developing a process evaluation plan for assessing health promotion program implementation: A how-to guide. *Health Promotion Practice*, 6 (2), 134-147).

vocational areas. The structure of the learning resources that the teachers were provided with was similar for each vocational area and consisted of: a PowerPoint presentation, three learning activities (focusing on hazards, health effects and controls respectively), digital resources, including a video clip and images, and links to other useful sources of information (such as the HSE website).

Participating colleges were provided with a lesson plan as a guide for implementing the VET materials, which was tailored to their respective vocational areas. The lesson plan included a PowerPoint presentation, a video and one learning activity of their choice. Colleges were encouraged to teach all three elements of the learning products to help inform (through key messages in the presentation), and engage (through the video) students as well as promote active learning (through the learning activity). To ensure that colleges would be able to fit the lesson into their existing curriculum, teachers were advised that the duration of the lesson would be approximately fifty minutes. The DVD and teaching material would also be easily accessible for students in the future as a point of reference or refresher.

2.2.3 Phase 1: Post-training interviews

A total of twenty-nine face-to-face interviews with students/young learners and their teachers were conducted between May and December 2012. Of those, twenty-one were conducted with students and eight with teachers. In order to maximise the amount of information that students would be able to recall, the interviews took place as soon as possible following the lesson. In the majority of cases, interviews took place between six to eight days post lesson implementation. However, due to logistical reasons, in one college the interviews took place two weeks after the lesson had been completed.

Table 1 provides information on the number of student and teacher interviews conducted across the eight colleges.

Table 1. Number of student and teacher interviews during Phase 1

Vocational area	Number of teacher interviews	Number of student interviews	Total number of interviews per vocational area
Welding			
3 colleges	3 (1 per college)	9 (3 per college)	**12**
Motor Vehicle Repair			
2 colleges	2 (1 per college)	6 (3 per college)	**8**
Stone Working			
3 colleges	3 (1 per college)	6 (2 per college)	**9**
Total number of interviews across all vocational areas	**8**	**21**	**29**

All of the students that took part in the interviews were in their first year of study at college. The majority were on an apprenticeship programme and were working alongside their studies. This would typically involve 'block release' with a certain amount of time spent at college and the remaining time in the workplace. For those students, the amount of time spent at college was reduced as the course progressed (i.e. with more time expected to be spent at the workplace during subsequent years of their training). Some learners were studying for other relevant college qualifications (e.g. City and Guilds courses) and were also getting appropriate work experience alongside their studies.

All the teachers interviewed had several years of teaching experience, which ranged from six to seventeen years. Further, all had more than ten years of experience in their respective industries.

2.2.4 Phase 2: Follow-up interviews

For the second phase of the research, a total of eleven interviews were conducted with students across three colleges that had taken part in the first phase of the study. All the follow-up interviews were conducted face-to-face and took place at the students' respective colleges between September 2012 and February 2013. They took place a minimum of three months following the implementation of the lesson to ensure that a sufficient amount of time had lapsed for students to have opportunities to apply their knowledge from the lesson to the workplace. All bar one of the students that were interviewed during the second phase were employed whilst studying. Their tenure with their respective organisations ranged from six months to three and a half years.

Additionally, telephone interviews were conducted with the students' supervisors between January and March 2013. Following consultation with the HSE, it was agreed that interviews would be carried out with six of the students' supervisors (two in each of the three vocational areas). The supervisors were initially approached by the respective colleges in order to ascertain whether they would be interested to take part in the study. Subsequently, the researchers contacted the supervisors in order to provide them with more detailed information about the study and the aim of the interview. However, after repeated recruitment efforts, only three from the initial six supervisors that were approached agreed to take part in a telephone interview[3]. Two of the supervisors worked in stonemasonry companies and one in a welding company. All three supervisors had substantial experience in their respective industries. Their tenure with their respective organisations ranged from four to twenty-eight years. Their supervisory responsibilities with regards to the students included: mentoring, and supporting them through their apprenticeship (e.g. completing progress reports for the college course), and task allocation to ensure that the apprentices acquired a breadth of experience in their respective vocational areas.

Table 2 provides information on the number of student and supervisor interviews conducted during the second phase of the study across the three vocational areas.

[3] *Potential reluctance to share information in the context of an HSE-funded research project may have contributed to the difficulties in recruiting supervisors to take part in an interview.*

Table 2. Number of student and supervisor interviews conducted across the three vocational areas during Phase 2

Vocational area	Number of student interviews	Number of supervisory interviews	Total number of interviews per vocational area
Welding	5	1	6
Motor vehicle repair	4	0	4
Stone masonry	2	2	4
Total number of interviews	**11**	**3**	**14**

2.2.5 Procedure for conducting the interviews

Two researchers independently conducted the face-to-face interviews during both phases of the research. At the start of each interview, details about the purpose of the research and assurances about anonymity and confidentiality were reiterated to participants. All interviews were audio recorded (with participants' consent), and transcribed for the purposes of data analysis. The student and supervisory interviews lasted between thirty and forty-five minutes, whilst the interviews with the teachers lasted for approximately one hour.

2.3 DEVELOPMENT OF INTERVIEW SCHEDULES

For the first phase of the study, a number of common topics were explored through the interviews with the teachers and the students. These included:

- Students' reactions to the lesson (including any aspects that were enjoyed the most and/or the least),
- The perceived benefits of the lesson (i.e. in terms of raising awareness of respiratory health risks and their potential health effects),
- The extent to which students were likely to remember the lesson in the long-term, and
- Suggestions regarding how the VET materials could be improved.

Additionally, the interviews explored teachers' views on i) how the lesson was implemented including the teaching approach that was adopted, ii) the factors that are likely to influence safe working practices among apprentices in the workplace, iii) the extent to which they would use the VET materials in the future, and iv) the extent to which they would be likely to recommend the use of the materials to other colleagues and/or colleges.

For the second phase of the study, the interviews with the students explored their views on the key issues that they remembered from the lesson on respiratory health risks, and the ways in which the lesson had helped them with their work on site, as well as their perceptions of health and safety in their respective organisations. Finally, supervisors were asked to evaluate the work of their respective apprentices (e.g. the extent to which they adopted safe working practices), and to reflect on whether they had observed any differences in their work over the last few months. In addition, supervisors were asked for the views regarding:

- Health and safety in their respective organisations, and the ways in which they promoted good health and safety practices among apprentices in particular,
- Any challenges that students might face in terms of using their knowledge on health and safety from their college training to their work on site, and
- Suggestions regarding how these challenges might be overcome.

2.4 DATA MANAGEMENT AND ANALYSIS

Data collected from the interviews were analysed thematically using the Framework, a systematic approach to data management and analysis (e.g. Ritchie and Lewis, 2003) that was developed by the National Centre for Social Research.

Framework involves a number of stages, including identifying the key topics and issues through familiarisation with the interview transcripts and then developing an initial analytical (or thematic) framework, which is used to summarise and analyse systematically participants' accounts. The questions, which were included in the interview schedules initially informed the development of the thematic framework, which was further refined to incorporate emerging themes from the interviews. The summarised data were then worked through drawing out the key elements and dimensions (themes) reflecting the range of experiences and views, as well as any similarities and differences in participants' accounts.

Two researchers worked collaboratively to develop the themes and any inconsistencies in interpretation were resolved through discussion.

The findings that emerged from the qualitative data reflect the range and diversity of teachers and students' experience of the VET materials and provide a good spectrum of the views and experiences that are likely to be found among teachers and young learners in VET for the specific vocational areas included in this study. However, the findings from this study cannot be generalised to the wider population, which is beyond the scope and aim of qualitative research.

3. PHASE 1 RESEARCH FINDINGS

This section presents the findings from the first phase of the study and is organised into sub-sections that discuss i) the implementation of the VET materials highlighting similarities and differences in the approaches adopted across the different colleges, ii) students reactions to the materials, and iii) the perceived effectiveness of the implementation (i.e. the aspects of the lesson that were enjoyed the most and/or least and were perceived as effective in terms of communicating key health and safety messages). The section concludes by summarising the findings regarding the extent to which the key messages from the lesson are likely to be retained by the students in the long-term, and offers suggestions regarding how the VET materials could be improved. It should be noted that throughout this report, interview extracts are used in order to help support and illustrate further key findings.

3.1 IMPLEMENTATION OF VET MATERIALS

As mentioned, teachers were provided with a lesson plan, which involved incorporating a PowerPoint presentation, a video and one learning activity of their choice. However, teachers were given discretion to tailor the learning products to their students' needs. Table 3 shows the components of the VET materials that the teachers across the eight colleges chose to incorporate in the lesson.

Table 3. Components of VET materials implemented across the colleges

Vocational subject area	**Presentation**	**Video**	**Type of learning activity**		
			Perception of risk	**Health effects**	**Controls**
Welding					
College 1	✓	✓	✓	✓	X
College 2	✓	✓	✓	✓	X
College 3	✓	✓	✓	X	X
Motor vehicle repair					
College 4	✓	✓	X	X	X
College 5	✓	✓	X	✓	X
Stone working					
College 6	✓	✓	✓	X	X
College 7	✓	✓	✓	X	X
College 8	✓	✓	X	X	X
Total	**8**	**8**	**5**	**3**	**0**

Teachers across all eight colleges incorporated the PowerPoint presentation and the video whilst the majority (6/8 teachers) also used at least one learning activity. Teachers from two colleges (one motor vehicle repair and one stone working college) chose not to incorporate a learning activity in the lesson. This was because the learning activities were not perceived as reflecting practical, 'everyday' examples that would be relevant to young learners' work on site. It is interesting to note that the teachers in two colleges included two learning activities, instead of one, as a means of enhancing the interactive component of the lesson. It should be mentioned that none of the teachers chose to incorporate the learning activity on 'controls'. This was

because there was a perception that this activity was more time consuming to implement and less conducive to group work, and hence students would be less likely to enjoy it.

In some cases, teachers also incorporated additional resources to complement the lesson plan on respiratory health risks. Specifically, teachers from a welding and a motor vehicle repair college showed a video depicting an individual suffering from occupational asthma, which was obtained from the HSE website, in order to reinforce the key message regarding the effects of breathing in harmful substances on health. The teacher from one welding college showed a video developed by the Welding Institute as an introduction to welding processes. This was because some students had limited practical experience, and therefore the video was useful for conveying basic health and safety information, and illustrating different welding processes set in a real welding environment.

In some instances teachers also provided young learners with a copy of the presentation to enable students to refer back to the lesson if needed, and encouraged them to visit the HSE website for further information on health and safety risks in their respective vocational areas.

Finally, the prevalent view was that the VET materials were easy to use. Specifically, the teachers explained that prior to the lesson they went through the lesson plan provided and the different elements of the lesson (e.g. PowerPoint presentation, learning activities), which did not require a large amount of preparation.

3.2 TEACHING APPROACH

The interviews explored the teachers' approach to communicating the key health and safety messages from the lesson. All teachers discussed the need to make the lesson interactive by encouraging students to ask questions throughout the lesson as well as inviting them to relate their own experiences from the workplace to the issues discussed. In addition, teachers felt that it was important for students to interact with each other during the lesson, through group discussions for example, and the learning activities were perceived as an effective means of facilitating such discussions.

There was some variability in how the learning activities were implemented across the colleges. For instance, in order to make the learning activity more competitive and 'fun', a teacher in one of the welding colleges introduced a prize for the team that provided the highest number of correct answers to the activity. Other approaches that teachers used included i) completing the learning activity both before and immediately after the lesson so that students could compare their answers and assess their learning, and ii) adapting the questions included in the learning activity so that students could complete them under 'exam' conditions in order to consolidate their learning.

In order to ensure that health and safety messages had an 'impact' on students, another approach that was commonly used by the teachers involved providing examples from their own industry experience, for instance by relating stories about individuals that they had known who had suffered from poor respiratory health or describing symptoms of poor health that they had personally experienced. This helped reinforce the message about the importance of taking the necessary safety precautions to protect one's health.

"That's the way I do with my teaching, which is to try and relate it to not historical facts but things I know of and things that have happened […] either back it up with true stories or back it with information." (Teacher interview 6, stonemasonry)

"The galvy flu which I'd already covered with them right at the very start and explained my symptoms when I had to do a lot of galvanised welding." (Teacher interview 4, welding)

"I knew a chap that died years ago from dust inhalation… it did kill him, it sort of put it into context […] I just sort of linked it back to reality, you've got to wear masks, and then clearing up after." (Teacher interview 3, stonemasonry)

Teachers also provided practical examples that students could relate to for instance by drawing similarities between smoking and the amount of fumes that they could potentially inhale. Finally, following the lesson teachers demonstrated key issues that were raised during the lesson at the workshop in order to consolidate students' learning and enhance their practical understanding. For instance, this included illustrating to the students how fine dust is or the types of checks that should be conducted before using local exhaust ventilation (LEV) equipment.

3.3 LEARNERS' REACTIONS TO THE VET MATERIALS

This section discusses young learners' reactions to the content of the lesson, and summarises their beliefs and perceptions as to whether they had gained a better understanding of respiratory health risks and of the measures that should be in place to protect their health. Their experiences are supplemented by the teachers' views regarding the ways in which the lesson benefited young learners.

3.3.1 Knowledge of long-latency diseases

The interviews explored students' perceptions of the extent to which the lesson had improved their understanding of the different ways that their health could be affected as a result of exposure to harmful substances. Students' self-reported understanding of respiratory health risks prior to the lesson varied, and appeared to range from having a basic understanding to having no awareness of the potential health effects. At one end of the spectrum, students acknowledged that prior to the lesson they were unaware of the fact that breathing in substances, such as welding fumes or dust, could have a negative effect on their health. There was also an acknowledgment that risks may often be disregarded because their effects on health were neither visible nor immediate:

"I didn't realise how many different, you know, bad things you could get from welding, like fume wise. I just concentrated on the burns and stuff when I was at work. […] I think it changes your attitude as well, because some people don't care because they can't see the immediate effects. But I think with me and the others in the class it really, you know, sort of hit home that too much can be really bad." (Student 19, welding)

At the other end of the spectrum were students who were familiar with some health effects (such as silicosis) but had not appreciated the scale to which their health could be affected. For instance, one stonemasonry apprentice explained that although he was aware that his job was dangerous, he had not appreciated the extent of 'damage' to his health that could result from being exposed to dust. The same apprentice also described that finding out that the 'fine dust particles' could affect his health was 'an eye opener'.

Overall, the prevalent view among young learners was that the lesson had increased their knowledge of the range of negative health effects that could result from exposure to harmful substances. For instance, young learners were able to readily mention specific symptoms and different types of respiratory illnesses and acknowledged that the effects of exposure to harmful substances could take a while to manifest. Young learners' typical reactions to finding out

about the potential short-term and particularly long-term effects on their health were that of surprise and fear. At the same time, there was a sentiment of gratitude among learners for becoming aware now rather than later on in their profession of these potential effects:

"It was the long term effects that kind of frightened me, you know, even though it might not affect you today, it's the fact of what's going to happen to you in twenty years' time […]" (Student 1, stonemasonry)

"It [the lesson] made me think about work and all the particles and like all the dust and that just goes about in the air and we've got plenty of air machines that filter it a bit but it's a bit scary like when you're right over doing a weld and you can imagine all that breathing into your lungs." (Student 6, welding)

"It's good to know this information now rather than in 5-10 years' time." (Student 2, welding)

Similarly, the prevalent view among the teachers was that the lesson had raised students' awareness of the effects of breathing in fumes or dust on their health. Further, it was commonly cited that the students were both surprised and concerned to learn about the potential long-term effects on their health. For instance, the teacher in one of the motor vehicle repair colleges mentioned that students were still concerned about their health several days after the lesson had taken place; similarly, in a stone working college, students were described as 'frightened' when learning about the potential long-term effects on their health whilst students with existing health conditions, such as asthma, questioned the teacher whether the types of masks that they were provided with at the workplace were adequate.

3.3.2 Understanding of risks and controls

Overall, students felt that the lesson had provided them with a better appreciation of the risks that they were exposed to in their respective vocations particularly regarding the amount of harmful substances (e.g. welding fumes, dust) that they could be inhaling but were not visible to them. Students' self-reported awareness of the risks prior to the lesson was variable. Some acknowledged that prior to the lesson they had been completely unaware of the risks that they were exposed to:

"I didn't know that isocyanate was always in the air when you're painting." (Student 8, motor vehicle repair)

"Yeah, [learnt] quite a bit because I had never had any information on welding fumes before, I really had no idea." (Student 21, welding)

Others had a broad understanding that dust or fumes were harmful so in some respect the lesson had served to confirm their previous knowledge. However, even among those students, the lesson had reportedly increased their awareness of precisely how exposure to these substances could affect their health:

"I didn't know that even though that you can't see it [dust], you know, that the fine particles are the ones that cause you damage and I thought it was kind of a bit of an eye opener for me." (Student 1, stonemasonry)

"I didn't realise the whole concept of like... it could just be like a small amount of fume over a period of time could make just as bad damage as a lot over a spaced out time if you get me […] Just kind of understood how it worked really, I wasn't really sure how it all worked." (Student 20, welding)

During the interviews, the majority of students were able to identify specific harmful substances that they were exposed to in their respective vocations (e.g. silica, welding fumes and isocyanates). There was also an appreciation that exposure to risks may be heightened depending on the activity and/or materials used (e.g. some welding processes may be more hazardous, some stones higher in silica content than others). For instance, several stonemasonry students commented that the lesson helped them gain knowledge about the levels of silica content in different stones, which they had not been previously aware of:

"There were stones up on that bar chart that I didn't know and also about different qualities of, well obviously how big the percentage was that sandstone damaged your lungs and how little others didn't. Yeah so I did learn quite a lot from the PowerPoint." (Student 4, stonemasonry)

"I was completely unaware of the silica content. Apart from being here, apart from being told that sandstone has a high content and limestone has a small content." (Student 12, stonemasonry)

"I knew obviously that silica is in different stones but I didn't know levels or percentages." (Student 11, stonemasonry)

Students also talked about the need to wear respiratory protective equipment (RPE) and felt that, following the lesson, they had a good understanding about the levels of protection offered by different types of masks and the circumstances in which these should be used. The majority of students made a distinction between air fed and paper masks acknowledging that the former provided the best protection from fumes and dust. For instance, stone working students discussed the need to wear air fed masks when working with stones that have a high level of silica content (e.g. sandstone), and ensuring that filters are regularly replaced to optimise the level of protection offered. Students across all three vocational areas acknowledged the importance of wearing a mask that had a good fit and covered the whole face.

Another type of control that was mentioned included using LEV equipment (or 'extractor fans' as were commonly referred to by the students). Specifically, students highlighted the need to position them correctly to ensure that harmful substances (such as fumes and dust) were removed effectively. Welding students in particular felt that the lesson enabled them to appreciate the importance of using LEV equipment:

"It's important to work with the extractor fans because I always… I found it pretty much as an obstruction because sometimes when you're welding and you hit it you get a noise when you weld especially with stick welding." (Student interview 5, welding)

Interestingly, in one welding college, the teacher noted some changes in students' practices following the lesson. In particular, the teacher explained that after the lesson he did not need to prompt students to use the extractor equipment. It was also observed that the students positioned the extractor correctly, which was perceived as evidence that the students had taken on board the information from the lesson and the importance of using the extraction equipment.

Overall, students were aware of the different types of controls that were available to them both from their college course and from their employer. For instance, students across all three vocations mentioned the importance of using masks, and personal protective equipment (e.g. overalls, gloves and goggles). Good safety practices were also reinforced at college; for instance, stone working students discussed that they disposed of their overalls to ensure that dust was not transferred outside of the work area. Other practices used at college involved wetting the stone to keep dust levels down as well as using dust suppression/extraction equipment. However, learning about the effects of breathing in harmful substances on health

enabled students to appreciate the risks and the importance of using RPE to protect their health. As one student illustrated:

"Well to begin with it was kind of like, when I was welding it didn't really seem necessary to wear my dust mask like because I thought that I couldn't see any signs at the moment […] and I thought 'oh I'll just do this one quickly, this one plate quickly like it won't do anything to me.' But then once I'd looked at the presentation you can see what, like it opens it out to you like lung cancer and it kind of like frightens you a little bit and like well when I'm grinding now I'm just like always, I've got to put my fume mask on." (Student 13, welding)

Some students expressed appreciation for being able to find about what the risks were before they started work. This appreciation extended not only to protecting their own health but also to looking out for the health of others. A young learner who was three months into his apprenticeship reflected on the value of the lesson:

"At least I know about it now prior to me getting too involved with the work and that and make sure I've got all my health and safety equipment there to prevent it happening." (Student 10, motor vehicle repair)

"For my own safety I suppose. I suppose other people's safety as well so like if I saw anyone, you know with their air vent off or you know, I could let them know sort of thing because I suppose they'll know the potential damages in the back of their mind as well." (Student 21, welding)

Further, the teachers commented that the lesson triggered a number of questions about the types of protective equipment that learners should be able to access at the workplace, as well as the employers' responsibilities for controlling learners' exposure to risks (e.g. supplying the right type of equipment and providing health surveillance, such as lung function tests). A teacher from a stone working college noted that the discussion on protective equipment was particularly beneficial for first year students with limited or no site experience as they were unfamiliar with what RPE and LEV was and why it should be used. In contrast, teachers in a stone masonry and motor vehicle repair college noted that students with site experience were more receptive to the lesson compared to younger/less experienced students. This was partly because the younger students had typically less industry experience and therefore did not view the issues raised as being of immediate relevance to them. Furthermore, there was a perception that younger students tend to feel 'invincible', and their perception of risk may be lower than that of their older/more experienced counterparts. As one teacher explained:

"When you're young you're sort of, you think you're going to be here forever, you're invincible, but so, particularly at sort of sixteen, seventeen year olds, more mature ones yeah sort of took it [the lesson] *on board a little bit more than the new starters."* (Teacher interview 5, motor vehicle repair)

3.4 PERCEIVED EFFECTIVENESS OF TRAINING

This section summarises learners and teachers' perceptions of the aspects of the lesson that were enjoyed the most, and were perceived as most effective in terms of communicating key health and safety messages.

3.4.1 Visual information

The findings suggested that young learners showed a preference for information that was presented visually. Specifically, when asked to indicate the elements of the lesson that they enjoyed the most, students most commonly referred to either the video clip that was shown

during the lesson or information presented in tables and/or bar charts. This was the case for students across all three vocational areas. The prevalent view among the students was that the video helped to illustrate the amount of dust or fumes that could be inhaled that would not be otherwise visible:

"Probably watching it [the fume] going into the guy's lungs […] because you wouldn't think really, you wouldn't get to see that really in a normal human I suppose." (Student interview 7, welding)

Interestingly, visual information (such as the video) was also most likely to be remembered in the follow-up interviews with learners, which took place a minimum of three months after the lesson on respiratory health risks was taught. Consistent with this, the prevalent view among the teachers was that students were most likely to retain information that was presented visually:

"The video would have been the, you know, the best part for them […] The type of students that we're likely to get are more, you know, hands on visual students [...] you remember a bit more, you know, seeing it visually." (Teacher interview 2, motor vehicle repair)

Additionally, visual information that conveyed the health effects from exposure to welding fumes made an impression on students in a college where the teacher showed a video depicting an individual suffering from occupational asthma and how the disease had affected both himself and his family.

On the other hand, written information appeared to be the least engaging means of communication for the students. For instance, there were several instances where the PowerPoint presentation shown during the lesson was described as 'wordy' and/or 'boring'. Although there was acknowledgement that information presented visually was most engaging, the findings also suggest that it is important for visual information to be sufficiently tailored to its audience. Specifically, there was a perception among the students in two colleges (a welding and a motor vehicle repair college) that the video was 'basic' in so far as it did not depict the work processes realistically and that it was aimed at a younger age group. This view was also concurred by the teacher in one of the colleges:

"It [the video] was really.. I think way too basic. If you were showing something like that to students I would have said it was aimed at a lot younger audience, it was too simplified." (Teacher interview 4, welding)

3.4.2 Learning activities

The prevalent view among the students was that the learning activities had helped them apply what they had learnt during the lesson, which made it easier to consolidate and remember the information. Students sometimes described that they found it easier to learn and remember information by 'doing' rather than simply 'writing things down'.

"Doing something front of you, making you do it, it sticks obviously. You're focussed on it so you make sure you're concentrating more and you remember more." (Student interview 11, stonemasonry)

In addition to encouraging students to apply what they had learnt during the lesson, the learning activities were also perceived as a form of feedback enabling students to become aware of and fill in any 'gaps' in their knowledge:

"I thought that the, the quiz at the end was the best. It's sort of like, it's like a feedback session and even if there was something you'd missed during the presentation then it was, you know, you were made aware of it then." (Student interview 16, welding)

Similarly, the prevalent view among the teachers who had incorporated a learning activity in their lesson was that it had been beneficial for the students because it helped to reinforce the knowledge that they had gained from the lesson. Further, because the students had to work as a group in order to complete the activities, there was a perception that the discussion and debate helped students become more engaged with the learning activity. One welding student commented that the learning activity was particularly enjoyable because it had enabled the students to share their knowledge as part of a group. This is further illustrated by the following interview extract from a teacher who had used a learning activity on the risks associated with different welding processes and materials:

"I did think the activity was good for them to participate at the end of it and they have gained a little bit more, it reinforces what they've already been taught as well [...] through the college. It also encouraged students to work as a team to complete the activity which helped them to become more engaged." (Teacher interview 4, welding)

Finally, completing the learning activity before and again at the end of the lesson appeared to be particularly useful as it enabled students to assess how much they had learnt following the lesson. For instance, one student noted that completing the activity a second time around made him appreciate how much he had learnt from the lesson. It is important to note however that only one college used the learning activity pre and post the lesson.

3.4.3 Combining theory with practice

There was a sentiment among students that learning about health and safety can be tedious although there was an acknowledgment that it was a necessity for their chosen career paths. However, there was a view that the format of the lesson made it easier to engage with health and safety. In particular, the practical activities that were incorporated made the lesson interactive making it easier to absorb and retain the information presented. Although young learners often described that the PowerPoint presentation contained a lot of text, there was a perception that the combination of the video and the practical activities helped to 'break up' the lesson.

In addition to the format of the lesson, the findings also suggest that the teaching approach was crucial in engaging students and demonstrating how the information from the lesson related to what the students might be encountering in their work. In reflecting on the teaching approach adopted, students across all three vocational areas consistently cited the use of practical, real life examples, which helped to illustrate the key points from the lesson. For instance, examples were given where the teachers explained how to use air fed masks and the reason why this type of mask was more effective than others. Several examples were also given where teachers related stories of individuals who had died of respiratory health diseases to demonstrate the importance of using the appropriate control measures to protect one's health. Students also referred to the importance of the lesson being taught by teachers who had experience in the industry and understand the practical realities of the job.

"You'd need somebody that knows what they're talking about to present it, otherwise you could give it a kind of... you don't learn much." (Student interview 15, welding)

"I thought [teacher's name omitted] explanations were fine because he sort of got the practical experience to sort of also give us another insight into, you know sort of real, real sort of things that you see." (Student interview 21, welding)

Teachers were invariably perceived as knowledgeable and able to make the lesson relevant to work on site. This is corroborated by the fact that all the teachers that took part in the study had substantial experience in the industry in which they were teaching about.

3.4.4 Lesson duration

The length of the lesson varied considerably across the different colleges and ranged from fifty minutes up to two hours. This was because teachers adapted the lesson in order to fit their students' needs. For instance, in some cases teachers opted to include all the 'basic' lesson components' (e.g. presentation, video clip, and one learning activity), however in other cases learning activities were not included. Additionally, in some cases teachers included more than one learning activity and/or videos. In addition to the number of components incorporated in the lesson, some teachers opted to include a learning activity both pre and post the lesson in order to 'test' and further consolidate the students' knowledge.

Given the aforementioned variability in how the lesson was implemented, it was not possible to ascertain whether there was an 'optimum' lesson duration. However, the prevalent view among the students was that the length of the lesson was sufficient and covered all the topics adequately. This suggests that the teachers had adapted effectively the lesson to their students' needs.

3.5 PERCEIVED CONFIDENCE IN KNOWLEDGE RETENTION

During the interviews, learners were asked to reflect whether they felt confident that they would remember the information from the lesson on respiratory health risks in the long-term. The prevalent view among the students was that they would remember the lesson and/or the key messages about how to protect their health and the potential health consequences of failing to do so. Students referred to key messages that they would remember, such as potentially 'getting asthma', 'silicosis' or 'lung cancer' if they did not use the appropriate RPE, or control equipment, such as LEV. For example, one student explained that he would be more likely to remember the 'scary parts' referring to the potential effects on his health:

"It's more the sort of scary things [...] the damage that it's going to do to you, you know, the sort of fear factor, fear makes, makes you remember things doesn't it?" (Student interview 12, stonemasonry)

There were also references to specific elements of the lesson that the students would remember, such as the video and the learning activities. In some cases, students reasoned that they would remember the lesson because health and safety is 'drummed into' apprentices at work. Interestingly, one welding apprentice explained that the lesson 'would come into his head' as he is welding at work:

"Just because when you think of the stuff that can happen and when you start welding it comes into your head and reminds you." (Student interview 7, welding)

Consistent with this, during the follow-up interviews, the video was frequently mentioned by learners across all three vocational areas suggesting that the information conveyed had 'stayed' with them in the long-term. For instance, there were references to the dust or fumes 'going into the dummy's artificial lungs' whilst welding students also referred to remembering how to position the LEV. Health effects were also commonly referenced, particularly those that were cumulative and developed over time, such as silicosis, and lung cancer.

Similarly, teachers were confident that the students would remember the key messages from the lesson. However, it was acknowledged that students tend to forget information easily, and that it

was important to reinforce the lesson by potentially teaching it again and, more importantly, by reinforcing good practices at college (ensuring that students wear their masks at the workshop for example). A teacher explained that reinforcing good health and safety practices at college could eventually promote positive 'habitual' behaviours and guard against complacency so that wearing masks and using extractor equipment becomes 'normal' practice among learners. There was a perception that colleges have a responsibility to create and promote a positive safety culture, and reinforcing good health and safety practices in the workshop was crucial:

"It's good having it [the lesson] in the classroom but reinforcement has to be in that workshop and it has to be squeaky clean in there. […] 'we have to be exemplary' because if we're exemplary they [students] can't turn round and say "we don't do it at college."' (Teacher interview 6, stonemasonry)

3.6 SUGGESTIONS FOR IMPROVING THE VET MATERIALS

Learners and their teachers provided several suggestions regarding ways that the VET materials could be improved further. Unless otherwise stated in the text, the suggestions presented below were discussed by both the learners and the teachers.

3.6.1 Improvements in content

Some suggestions were provided regarding how the content of the VET materials could be enhanced further. These included:

- **Real-life examples of respiratory health diseases:** There was a perception that the VET materials could place more emphasis on the consequences of suffering from respiratory health diseases. Learners and teachers across all three vocational areas discussed the need for more information to be included in the form of videos or testimonies. Specifically, it was suggested that 'before and after' testimonies of how individuals and their families had been affected by respiratory health disease would be more 'powerful' in conveying the importance of taking the necessary safety precautions to protect one's health.

- **Information on PPE and RPE:** Welding students and teachers mentioned that more information could be included on the different types of PPE and RPE available (such as air fed masks) as well as on how to change RPE filters and check for signs of damage.

- **Information on different types of power tools:** A stonemasonry teacher suggested that there should be information on the different types of power tools that are commonly used in the workplace (such as angle grinders) and the amount of dust that they generate; it was suggested that this information could be conveyed through images/photos.

3.6.2 Improvements in video and use of visual aids

Several suggestions focused on using more visual aids to convey key health and safety messages whilst some suggestions were made regarding potential improvements to the video. More specifically:

- Both learners and teachers felt that the welding video was aimed at a younger age group, which limited its perceived effectiveness. A more general observation made by teachers across all three vocational areas was that the videos would have been more 'powerful' if they had been filmed in a real, rather than 'artificial', work setting.

- A prevalent view among teachers and learners in all three vocational areas was that the VET materials should have included more images/photos and examples of different types of respiratory health diseases and their symptoms. It was suggested that visual information was more likely to 'grab' students' attention and enhance knowledge retention. Further, there was a perception that the use of 'shock tactics' would be more likely to affect students and reinforce the key messages from the lesson.

Despite the aforementioned suggestions, the prevalent view among the teachers was that the VET materials were easy to use, and the content was relevant to the students' vocational career paths. A teacher also commented that an advantage of the VET materials was that they provided teachers with different ways (e.g. through the video and learning activities) of communicating and engaging learners with messages about respiratory health risks. Additionally, the prevalent view among the teachers was that the VET materials complemented the colleges' existing curriculum, as in most cases respiratory health risks were not covered in sufficient detail in the syllabus. In some cases, it was mentioned that the college did not have a module, which was specifically dedicated to respiratory health.

Consistent with this, teachers commented that they would use the VET materials again. For instance, a stonemasonry teacher noted that he would teach the lesson again to both first and second year students whilst another stonemasonry teacher had recommended the VET materials to other colleagues in the college. Similarly, one welding teacher noted that he intended to use the materials with future student cohorts. Finally, all teachers commented that they would recommend the VET materials to other teachers.

4. PHASE 2 RESEARCH FINDINGS

This section summarises the findings that emerged from the interviews conducted with students and their supervisors[4] regarding the perceived impact of the lesson on students' attitudes and/or practices in the workplace, and the factors that influence the 'on-the-job' application of the knowledge and training obtained at college. Relevant findings from the interviews with the teachers during the first phase of the study will also be used to complement those from the student and supervisory interviews.

4.1 REPORTED CHANGE IN ATTITUDES AND BEHAVIOURS

Supervisors were asked to reflect on whether they had observed any changes in the respective learners' working practices (the telephone interviews with the supervisors took place a minimum of three months following the lesson on respiratory health risks). None of the supervisors interviewed had observed any changes in learners' health and safety practices. This was partly attributed to the fact that the learners were well versed with company practices and expectations, such as the importance of wearing PPE and RPE, as all of them had worked for their employers for a substantial amount of time prior to embarking on their studies. Supervisors described that company practices dictated that PPE and RPE should be worn at all times and that this standard was applied across the whole of the workforce. As such, the learners were perceived as complying with the standards expected, although in one case a supervisor commented that he occasionally had to remind the learner to wear his mask.

However, the findings from the supervisory interviews contradict those that emerged from the learner interviews, which suggest that following the lesson, there were self-reported changes in terms of improved risk perception and practices in the workplace. An improved risk perception appears to have partly stemmed from an appreciation of the risks associated with exposure to harmful substances, and a realisation of the necessity of using PPE and RPE to protect one's health. One stonemasonry student acknowledged that the lesson had *'affected him'* and enabled him to appreciate that the danger from dust exposure is *'imminent'*:

"I know there's more imminent danger, I know to be very more aware at least you know and if someone else is doing something I know to get away from them when they're doing it or make sure I've got like [...] you need ear protection, a mask, goggles or, you know, just anything really. So it's, it has affected me quite a lot. It's affected the way I operate, the way I think, the way I deal with people you know." (Student interview 2, stonemasonry, phase 2)

There was also a view among young learners that the lesson had made them more aware of the risks and health implications. One welding student, for example, highlighted that prior to the lesson he was unaware that exposure to fumes could harm his lungs:

"It [the lesson] changed us about the, about the gases, that's the big thing from that; it changes that because I thought the gases were just there, just normal fumes but obviously it's not [...] it can damage you, you know, damage your lungs." (Student interview 9, welding, phase 2)

Consistent with this, a number of learners acknowledged that they had changed their practices following the lesson. This involved wearing their masks more frequently and particularly for prolonged tasks (e.g. when spraying or cutting stone for a long period of time). For instance, a

[4] *Although a small number of interviews were conducted with supervisors, the findings from the teacher interviews suggest that there was a high degree of corroboration (i.e. common themes emerged across the supervisor and teacher interviews). Further, all the teachers had substantial industry experience in their respective vocations, thus their insights were particularly relevant and valuable for the second phase of the study.*

welding student explained that, following the lesson, he wore his mask more frequently; he further acknowledged that prior to the lesson he was resistant to wearing his mask because he could not see the fumes when he was welding. There were also examples where students changed the type of mask that they wore at work to one that was perceived to be more effective in protecting their health. For instance, a motor vehicle repair student noted that after the lesson he started wearing an air fed mask which covers his face and neck *'so that nothing gets through'*. In addition, welding students in particular commented that after the lesson they were more aware of the importance of positioning the LEV equipment correctly. One welding student described that he would make sure that both himself as well as others around him positioned the LEV correctly:

"I wasn't wearing my mask as much as I should be, I wasn't having the extractor right next to me but now I do. Like if I go into someone's bay to watch them weld I'll always move their own extractor, it's a habit now, just nearer to them". (Student interview 8, welding, phase 2)

One stonemasonry student also reported that, following the lesson he requested dust suppression equipment, which was provided by his employer.

It is important to note that one possible reason as to why supervisors had not observed the self-reported changes in learners' working practices may be due to the fact that they might have had limited opportunities to observe the learners' practices. In one organisation, for instance, learners spent more time with what were referred to as 'journey men' who were experienced workers responsible for looking after and mentoring them. Another possible reason might be that in some cases learners' working practices were described as 'very good' or 'exemplary' so it is likely that any differences (such as wearing masks more frequently) might have been too subtle to be readily observable by the supervisors.

4.2 FACTORS INFLUENCING LEARNING TRANSFER IN THE WORKPLACE

A number of factors were identified from the supervisory interviews as important for the on-the-job application of young learners' knowledge and training. These were categorised as either 'enablers' (i.e. promoting the application of knowledge in the workplace) or 'barriers' (i.e. hindering the on-the-job application of knowledge and training).

4.2.1 Enablers

4.2.1.1 Company size and resources in health and safety

Overall, learners spoke positively about the provision of PPE and RPE in their respective workplaces. In particular, in all cases employers provided students with masks, overalls/suits, safety glasses and gloves. However, there were variations in terms of the type and quality of equipment provided. For instance, one case was identified where a welding student, who worked at a garage, reported that LEV equipment was not provided. Further, in some cases learners reported that their employers provided them with the more expensive air fed masks whilst in other cases the cheaper disposable cartridge masks were provided. Although information on the size of the organisation that the learners worked in was not systematically collected during the interviews, there was some evidence to suggest that larger organisations might provide better quality equipment (such as air fed masks) compared to smaller ones. Specifically, teachers suggested that smaller organisations typically have fewer resources and are consequently less likely to invest in expensive, better quality equipment.

"It's going to come down to the employer and finances. I know some of the learners wear cartridge masks which is, it's okay for small exposure, but I wouldn't be wearing a cartridge mask spraying two or three hours a day." (Teacher interview 5, motor vehicle repair)

In light of this, there were examples where teachers encouraged learners to buy better quality masks if they were not provided by their employers. The teachers also suggested that smaller and/or private companies might be less likely to enforce the use of masks so that using RPE is seen as a 'personal choice'. This was also confirmed by some of the student interviews. For instance, one stonemasonry apprentice who worked for a private contractor commented that it was his responsibility to ensure that he carried out the task as safely as possible, including deciding whether to wear a mask. There was also some evidence to suggest that larger organisations might have more resources to ensure that workers comply with health and safety procedures. For instance, another stonemasonry apprentice described that health and safety officers carried out frequent spot checks to ensure that the appropriate equipment was used and that risk assessments and relevant work documentation was suitable/appropriate. On the other hand, these resources would not be typically available in smaller organisations, such as garages, where enforcement of health and safety practices appeared to be dependent upon the supervisor and/or company proprietor.

4.2.1.2 Training

Training apprentices in the use and maintenance of their RPE and PPE (e.g. masks and boiler suits), as well as in methods to minimise dust contamination were identified as a means of promoting positive practices among learners in two stonemasonry organisations. One supervisor explained that when they are first given a mask, apprentices are taught how to use and clean it; in addition, they are expected to keep a maintenance log of all their PPE and RPE, and that failure to do so could potentially result in disciplinary action. Similarly, another supervisor explained that apprentices are shown how to use 'hoovers' to prevent dust contamination, as well as how to clean and dispose of their boiler suits to ensure that dust is not transferred to common areas used by employees.

4.2.1.3 Supervisory support and behaviours

Supervision emerged as playing an important role in ensuring that learners follow the necessary safety procedures as well as use the required PPE and RPE in the workplace. This was crucial as it was noted that learners often forget to wear PPE and RPE particularly when working on tasks for brief periods of time. Therefore, there was a perception that supervisors play a key role in reminding students to wear the appropriate safety equipment and highlight the risks that they would be exposed to for failing to do so. One supervisor, however, noted that it was not possible to supervise learners continuously and that although he enforced the use of masks it was important that learners develop a sense of personal responsibility for using the appropriate equipment:

"We will enforce the mask on them [apprentices] but if, you know, we can't always be supervising them directly, you know, there'll be tasks where they have to get on with it themselves […] I'll be going around the other people I'm doing or doing my own work but then obviously, you know, supervising them from time to time, especially when they're stone cutting […] there is a bit of lone work. They're not, they're working by themselves but obviously there are other people in the vicinity so they're always safe but, but enforcing themselves to wear the mask..." (Supervisor interview 1)

Teachers also emphasised that the use of masks should be enforced by those responsible in the workplace, such as supervisors, as very often the adoption of safe practices comes down to 'personal choice'.

Reprimanding learners was another approach mentioned by supervisors for enforcing the use of the appropriate PPE and RPE. There was variation in terms of how 'formal' the type of reprimand provided was. For instance, one supervisor mentioned that he would 'shout at' students for not wearing their masks, whereas another supervisor mentioned that students would get a verbal warning followed by a written one for failing to wear their PPE, such as safety glasses.

Modelling safety behaviours also emerged as important whereby supervisors set an example of the types of safety practices that should be adopted. One supervisor for example mentioned that he always wore his mask and the required PPE, and encouraged the more experienced workers to do the same in order to set a good example for the apprentices. There was some evidence to suggest that apprentices also pay attention to the extent to which their supervisors model safe practices. For instance, one motor vehicle repair apprentice noted he wore his mask constantly although his boss/supervisor did not wear his RPE as often as he should.

4.2.1.4 Communication of respiratory and wider health and safety risks in the workplace

Supervisors highlighted the importance of reminding students the risks associated with exposure to fumes and dust. These were typically communicated through the use of toolbox talks and health and safety discussions, which were held twice a month as two supervisors noted. It was suggested that talking to students, as well as employees, rather than simply providing information through leaflets for example, was the best approach for promoting good health and safety practices in the workplace. One supervisor noted that very often employees have difficulties understanding the terminology used in leaflets that aim to raise awareness about risks:

"I've found that the best way of promoting like good health and safety practice is just talking, sitting down and talking to the workers and explaining things […] Sitting down and explaining it to them because a lot of people, especially young people don't understand some of the terminology they use [in leaflets]*."* (Supervisor interview 2)

Similarly, teachers suggested that although the lesson on respiratory health risks, and college training more broadly, provides students with a 'good grounding', it important that employers raise awareness among their staff about the dangers of exposure to dust or fumes. Some examples of safety communication provided by learners regarding their respective workplaces included toolbox talks, health and safety talks on specific topics (e.g. hand-arm vibration) and health and safety posters. However, this was not consistent across all the sample of students interviewed and in some cases safety communication appeared to be limited to the type of equipment that the apprentice needed for the task, provided by the supervisor and/or company owner.

4.2.2 Barriers

4.2.2.1 Production versus safety

The findings suggest that the emphasis that an employer places on production may influence the extent to which learners, and workers more broadly, are encouraged to adhere to health and safety practices. Specifically, there was a perception among stonemasonry students in particular that in private companies there was pressure to work quickly and consequently there might be less emphasis on adhering to health and safety practices. On the other hand, the opposite might be the case for larger and/or government-funded organisations. For instance, one stonemasonry student that worked for a government-funded organisation mentioned that the organisation's

ethos was that *'work takes as long as it takes'* suggesting that workers may be less likely to feel that they need to cut corners.

"Time is money to these private firms, you know what I mean? Whereas to us, it is but it's not an issue you know, because obviously we're a government agency [...] private firms can't afford to waste time and that because its money. So that's kind of maybe why they cut corners and that." (Student interview 1, stonemasonry, phase 2)

The student also commented that in his company they used a 'hammer and chisel' compared to private companies, which use grinders in order to complete jobs quicker because 'time is money'. In contrast, a stonemasonry student working for a private contractor commented that there was emphasis on working quickly but also safely.

"…Because, because in a private contractor world, work is very quick, it's very fast but at the same time you've got to do it as safely as you can." (Student interview 2, stonemasonry, phase 2)

It is important to note that the emphasis placed on production was not identified as a barrier to the promotion of health and safety practices among the supervisors. This is perhaps not surprising as supervisors might be inclined to portray a 'positive image' of their respective organisations and of their industry more broadly.

4.2.2.2 Perception of risk

There was a perception among teachers that younger learners who have just started out on their training and have limited work experience are more likely to have an 'invincible' attitude and thus may be less susceptible to messages about health and safety, compared to their older and more mature counterparts. However, it was also suggested that 'catching' students at the beginning of their training was the most appropriate time to communicate messages about respiratory health risks, and health and safety more broadly. Specifically, there was a perception that learners' attitudes and behaviours are likely to change as their level of awareness about the hazards in the respective industries increases. Consistent with this, it was suggested that having a 'good grounding' of health and safety knowledge at an early stage during college training increases the likelihood that learners would sustain positive health and safety practices in the workplace.

"[…] and it's not just their behaviour that'll change, I think their attitudes will change as well. Once they realise, you know, what the hazards are on site, you know, again their perception of risk, we're actually increasing and improving their perception of risk." (Teacher interview 7, welding)

"Well it's the right ethos to go for when they're just starting in the industry or just starting in training and, yes it's the right time to catch them. You've got more chance, more chance of turning them before they get into bad habits." (Teacher interview 2, motor vehicle repair)

4.2.2.3 Peer behaviours

Peer behaviours, and peer pressure in particular was identified as an important element of ensuring that young learners are able to sustain the positive practices that they learn at college in the workplace. This is because students are likely to 'adjust' their working practices by observing others' and particularly older workers' practices. One factor that may discourage the adoption of good practices in the workplace is that apprentices may pick up 'bad habits' in the workplace. Consistent with this, both teachers and supervisors felt that apprentices often pick up

bad habits from older workers (e.g. not wearing masks) or from other workers/contractors that may be working on the same site.

"If [name of apprentice omitted] is working with someone else, if they're not doing it [safety practices], following the sort of stuff then it's easy to slip into bad habits." (Supervisor interview 2)

It was suggested that older workers can sometimes be 'stuck in their ways' and that the justifications provided for not wearing PPE or RPE is that their use disrupts or makes their work harder. For instance, one supervisor gave the example of an older stonemason who refused to wear a mask because it steamed up his safety glasses thus preventing him from carrying out the job. In addition to picking up bad habits from older workers, the teachers explained that several workplaces are characterised by a 'macho culture' and that apprentices could be challenged or ridiculed for wearing masks.

"Peer pressure, yeah. A typical 'what are you wearing that for, you wimp?' that type of attitude from some of the older guys". (Teacher interview 2, welding)

However, it is important to note that examples of a 'macho culture' were not identified from the interviews with learners. There was a sentiment, however, among the teachers that although apprentices may learn safe working practices in college, it is difficult to control what they learn once they are in the workplace:

"All the time [students getting criticised for wearing a mask on site]. And again it's… we can educate the young kids coming in here, you can't educate what's out there." (Teacher interview 6, stonemasonry)

Consistent with this, there were students who acknowledged that they encountered unsafe practices at work. One welding student noted that the more experienced workers in his workplace were more likely to adopt bad practices, often making excuses that the PPE provided was inconvenient for the job. Interestingly, however, the student in question noted that he was not challenged by his older and more experienced colleagues for wearing his mask. In some cases, students mentioned that they would wear their masks even if their older counterparts did not use them. There was some evidence, however, to suggest that the more experienced apprentices might challenge their younger counterparts if they follow unsafe practices. An apprentice, who had been working for his organisation for over three years, mentioned that he would remind younger apprentices of the risks that they are exposed to for not wearing their masks:

"If I see them [younger apprentices] doing something stupid or I see them not, if they're not wearing a mask when they're supposed to be I say 'well look you're causing yourself harm and if you want to do that you do it and that's up to you, I've told you, my responsibility is done.' […] But at the same time I can't physically go up to him and force him, put it [the mask] on his face." (Student interview 2, stonemasonry)

4.2.2.4 Risk awareness among employers

One barrier that was raised by the teachers was that some employers are unaware of respiratory health risks, and as a consequence they may be unwilling to invest money to buy more expensive and effective types of equipment. For instance, it was described that employers often provide masks with disposable cartridges, which although they were perceived to be safe to use for short-term exposure to harmful substances, they were reportedly ineffective when cutting stone or paint spraying for extended periods of time. Further, there was a perception that

employers are often 'short-sighted' because they do not realise the benefits of investing in more expensive equipment, which could save them money in the long-term because they last longer compared to cheaper ones:

"It could come down to money...I mean the kind of stuff that we wear; the airstream helmet is a quite expensive piece of kit. And they won't pay that kind of money. But then if you look at it long term and how long this bit of kit lasts and it's relatively cheap to maintain, then it's actually better money invested than buying these disposal masks." (Teacher interview 1, stonemasonry)

Raising employers' awareness of the risks from exposure to dust or fumes was perceived to be particularly important as it was highlighted that workplace practices often differ from those in college. Specifically, stonemasonry teachers explained that in the workplace learners often use power tools, such as grinders, which create higher levels of dust thus potentially increasing the dangers from exposure.

4.2.3 Suggestions for overcoming barriers to learning transfer

Several suggestions emerged from the interviews with the teachers and the supervisors regarding how health and safety practices and transfer of students' college training can be promoted in the workplace. These were as follows:

- **Challenging older workers to work more safely as they set an example for apprentices and less experienced workers:** Supervisors suggested that it was important to challenge older workers 'constructively' as they can be 'set in their ways'. One supervisor, for example, gave an example of trying to 'reason' with older workers and encourage them to try alternative, safer ways of working.

- **Frequency of safety communication:** Supervisors emphasised the importance of having frequent health and safety talks with apprentices to explain risks. Teachers also highlighted the important role that employers play in raising awareness among their workers, including apprentices, of respiratory health risks (and health and safety risks more broadly).

- **Channels of safety communication:** Supervisors suggested that health and safety messages should be formulated using a language that is easy to understand (e.g. not using technical terms) with an emphasis on how learners' personal health could be endangered if the appropriate PPE and RPE is not used. Further, the communication of health and safety messages should be compatible with the technology that learners are most likely to use. For instance, the use of videos, rather than leaflets, was perceived to be more effective in communicating health and safety messages as they are more easily accessible to apprentices through mobile technology.

- **Educating employers about respiratory health risks:** There was a perception among the teachers that employers are neither sufficiently aware of the risks from exposure to dust or fumes nor of the measures that there should be in place to mitigate these risks. For example, it was suggested that employers should offer lung tests, however the perception was that they were rarely provided. In addition to respiratory health risks, the teachers felt that it was important to communicate to employers the long-term benefits of investing in more expensive, and consequently, more effective equipment. One stonemasonry teacher also recommended that having clearer industry guidelines on what is required to effectively control dust levels in the workplace would be beneficial.

5. IMPLICATIONS

This section discusses the implications of the research findings for i) the implementation of the VET materials and more broadly the communication of health and safety messages at college, and ii) how training transfer[5] in the workplace can be improved.

5.1 IMPLEMENTATION OF VET MATERIALS

The findings from this study can help inform the communication of respiratory health risks and LLDs to young learners, and the implementation of similar VET materials. These are discussed below.

5.1.1 Use of visually engaging information

The findings suggest that the young learners in this study found visual information easier to absorb and engage with. For instance, students most commonly referred to the video as an aspect of the lesson that they enjoyed the most; the information that was presented through the video also appeared to reside with the young learners in the follow-up interviews, which took place at least three months after the lesson. Some of the suggestions provided by both the teachers and the students for improving the VET materials focused on including more photos and images. On the other hand, written information appeared to be the least engaging means of communication for the students. Where it was used, young learners expressed a preference for written information to be used in conjunction with visual information and interactive exercises. These findings support previous research, which shows that young learners prefer to receive health and safety information visually (Mowlam et al., 2010).

5.1.2 Experiential learning

The findings from this study suggest that the use of practical activities that encourage young learners to apply their knowledge may enhance engagement with messages regarding respiratory health risks (as well as with health and safety information more broadly) and contribute to knowledge retention. Completing the learning activities as a group (rather than in pairs or individually) was the preferred approach used by the teachers in this study. There were several benefits reported from completing learning activities as a group including knowledge sharing and improving student engagement. Teachers also highlighted the importance of 'learning by doing' by demonstrating in the workshop the key issues that were raised during the lesson in order to consolidate students' learning and enhance their practical understanding. These findings suggest that experiential learning, through the use of learning activities and practical demonstrations, may be an important means of communicating respiratory health risks, and more broadly health and safety messages to young learners. This is also supported by literature that shows that active learning, for instance, through activities and discussion/dialogue increases learning and knowledge retention, compared to passive teaching approaches such as lectures (e.g. Hamer, 2000; Burke and Hutchins, 2007).

5.1.3 Tailored messages and use of real life examples

A common approach used by the teachers in this study in order to reinforce the consequences of exposure to respiratory health risks involved relating stories about individuals that they knew who had suffered from poor respiratory health or describing symptoms that they had personally

[5] Positive training transfer occurs when trainees successfully apply the skills and knowledge obtained through training at the workplace (Baldwin and Ford, 1988).

experienced. Another approach adopted involved connecting the knowledge from the lesson to the real work environment, for instance, by providing practical examples that students could relate to. These approaches appeared to resonate with the students who referred to the importance of being taught by teachers who have experience in the industry and understand the practical realities of the job. These findings corroborate previous research that suggests that young learners are more receptive to real-life examples and messages that are framed in the context of their specific jobs (Mowlam et al., 2010).

5.1.4 Receptiveness to messages

It has been suggested that learners may be more receptive to health and safety messages at the initial stages of their training (Mowlam et al., 2010). Whilst this issue was not explicitly addressed in this study, it is worth noting that there were examples where students expressed appreciation for finding out about respiratory health risks early on in their vocational career path so that they could take the appropriate measures to protect their health. It is also worth noting, however, that a view expressed by the teachers in this study was that students with site experience were more receptive to the messages on respiratory health risks because they were of more immediate relevance to them compared to students with little or no site experience. This suggests that previous work/site experience might be an important factor to consider in terms of how likely young learners are to respond and take on board messages about respiratory health risks.

5.2 LEARNING TRANSFER IN THE WORKPLACE

The study identified a number of factors in the work environment that were perceived as inhibiting or facilitating the transfer of learning and the promotion of positive safety practices in the workplace. These included: company size and the availability of resources invested in health and safety (e.g. larger organisations investing in better quality equipment), supervisory support and behaviours including the reinforcement and modelling of safety practices, as well as peer behaviours. These factors are supported by models of learning transfer that highlight the importance of the work environment, including peer and supervisory behaviours, and opportunities to apply the training in enabling the application of training in the workplace (Baldwin and Ford, 1988). The findings on the aforementioned factors are discussed below.

5.2.1 Organisational support

The findings from this study suggest that organisational support in the form of resources invested in health and safety, and the availability of PPE and RPE in particular, may influence the extent to which young learners can apply the practices that they learn at college in the workplace. There was a perception that larger organisations have more resources available for health and safety and are thus more likely to provide better quality equipment, as well as formally enforce good health and safety practices. On the other hand, the provision of good quality equipment might be more variable in smaller organisations (depending on the availability of resources), and the adoption of positive safety practices might be viewed as a ‘personal choice’. Although this study did not systematically collect information on the size of the organisations that the different learners worked at, examples whereby using PPE and RPE was a ‘personal choice’ and examples of more ‘visible’ enforcement (e.g. spot checks carried out by health and safety officers) were identified. These findings support previous research that has shown that the size of an organisation and the provision of health and safety resources can act as barriers to the implementation of good safety practices in the workplace for young learners (Mowlam et al., 2010).

Further, raising employers' awareness regarding the consequences of exposure to respiratory health risks and the long-term benefits of investing in the provision of good quality equipment and RPE might be particularly important in small to medium sized companies where 'bosses' or senior managers are very often the gatekeepers of health and safety resources (Stephens, Hickling, Gaskell, Burton, and Holland, 2004; cited in Lansdown, Deighan and Brotherton, 2007).

5.2.2 Peer behaviours

Peer behaviours were identified as an important influence on the extent to which young learners are able to maintain the positive practices that they learn at college in the workplace. This is because young learners are likely to be influenced by and conform to the working practices around them, and could potentially 'pick up' bad habits from older workers. This is supported by previous research findings, which suggest that young learners may be more inclined to adopt the practices of their older, more experienced counterparts, and that training transfer may be either positive or negative depending on older workers' level of knowledge and the safety of their work practices (Mowlam et al., 2010). Given the potential influence of older workers on young learners' behaviours, it is important, consistent with some of the suggestions provided by participants in this study, to challenge and educate older workers regarding safe working practices.

5.2.3 Supervisory support

Modelling positive health and safety behaviours as well as providing sanctions for poor health and safety practices were perceived as important strategies that supervisors use to support young learners and promote positive health and safety practices in the workplace. Research findings have shown that supervisors play an important role in supporting and promoting learning transfer in the workplace. Examples of supervisory supporting behaviours include providing positive feedback, supporting and coaching trainees in the use of new knowledge and skills (Burke and Hutchins, 2007), providing trainees with time to apply their knowledge and skills, and modelling desired behaviours (Hastings, Sheckley, and Nichols, 1995; cited in Holton, Bates, Seyler and Carvalho, 1997). Giving positive reinforcement to young learners for implementing desired behaviours is another supervisory behaviour that helps enhance the transfer of learning (Burke and Hutchins, 2008). In addition to supporting trainees, supervisors can play an important role in promoting norms for safe working, for instance by challenging older worker practices and encouraging them to adopt alternative, safer ways of working.

5.2.4 Production versus safety

Young learners in this study suggested that pressures to work quickly, particularly in private organisations, might encourage corner cutting and, hence, influence the extent to which health and safety practices will be adhered to. Time pressures have been identified as a potential barrier to young learners' ability to implement health and safety practices, particularly in workplaces where completing a job quickly is tantamount to making a higher financial return (i.e. the higher the number of jobs completed, the more money received) (Mowlam et al., 2010).

5.2.5 Other influences on learning transfer

Although beyond the scope of this study, it is important to acknowledge that there are other factors, in addition to the work environment, that influence learning transfer, and hence need to be considered. These include learners' characteristics (ability, personality and motivation) and the training design and delivery (Baldwin and Ford, 1988). With regards to training design and delivery, content relevance (e.g. ensuring that there is a close link between the training content

and the work setting where the knowledge and skills will be applied) and instructional approaches that are based on active learning, and providing learners with feedback and positive reinforcement all help facilitate learning transfer (Burke and Hutchins, 2008). With regards to trainee characteristics, cognitive ability, motivation to learn and apply the knowledge and skills gained to the work setting, and self-efficacy (i.e. perceived competency in carrying out a task) are also important factors that influence the transfer of knowledge and skills in the workplace (Burke and Hutchins, 2008).

5.3 CONCLUSION

Overall, the prevalent view among both young learners and their teachers was that the VET materials had increased learners' knowledge of the risks that they were exposed to in their respective vocations, and of the range of respiratory health illnesses that could result from breathing in harmful substances. Further, there was an appreciation among young learners that these effects could be cumulative and take time to develop, as well as a heightened awareness of the importance of using the necessary controls to protect their health. Consistent with this, the findings revealed several examples of self-reported changes among students in terms of their risk perception and the practices adopted both at college and in the workplace.

Further, the findings from this study suggest that there are several factors to consider in the implementation of VET materials designed to communicate and promote awareness of respiratory health risks among young learners. What was evident from this study was that young learners expressed a preference for information that was presented visually, rather than in written form, and which was tailored to the practical reality of their job. This may be particularly important for raising awareness regarding risks that are 'not visible' and whose effects may take time to develop (as was the case in this study). There was also an emphasis on the importance of active learning, that is 'learning by doing', in order to enable young learners to apply and consolidate their knowledge. Further, the inclusion of personal examples or testimonies that young learners could relate to was perceived to be a 'powerful' means of conveying messages about respiratory health and the importance of using suitable RPE.

What was also evident however was that it was important to reinforce messages about respiratory health risks and positive safety practices both at college and in the workplace. In this respect, this study identified several barriers that young learners might face in transitioning from college to the workplace. Specifically, organisational support in terms of the amount of resources invested in health and safety and in equipment to control respiratory health risks more specifically, and peer behaviours (particularly the potential 'pressure' to conform to practices in the workplace that might be unsafe) are some of the factors identified in this study that might inhibit the extent to which knowledge and safe working practices from the college environment can be transferred to the workplace. Equally important, however, were the findings regarding the role that supervisors can play in promoting and modelling safe behaviours, as well as other aspects of the work environment including the provision of training, and health and safety communication. Thus, the findings from this research suggest that learning transfer might be affected by a plethora of factors, which is supported by both existing empirical research and theoretical models of learning transfer.

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Process evaluation of the Long Latency Health Risks Division (LLHRD) vocational training interventions

Three vocational education and training-based (VET) learning products/materials were developed in order to raise awareness of long latency respiratory health risks in three of the high risk vocational areas affected by these issues: motor vehicle repair, welding and stone masonry. The aims of the study were to explore how the VET materials can be implemented, and the perceived effectiveness of the implementation from the perspectives of students/young learners and their teachers and identify the factors that promote and/or inhibit learners' application of their training in the workplace

There was a prevalent perception, among both students and their teachers, that the HSE vocational education training (VET) materials were both relevant to the young learners' respective professions, and helped to raise awareness regarding the nature of respiratory health risks, their potential short and long-term health effects and the ways in which learners can protect their health. The VET materials complemented the colleges' existing curriculum, as in most cases, respiratory health risks were not covered in sufficient detail in the syllabus. Teachers commented that they would use the VET materials again with future student cohorts, and that they would recommend them to their colleagues and/or other teachers.

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