Carbon Literacy: Knowledge (CLK)
E-learning Effectiveness Report

June 2017

VIRTUAL COLLEGE

Carbon Literacy Project

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Aims

To gain insight into the effectiveness of e-learning as a delivery method for the CLK section of Carbon Literacy.

Objectives

Objective 1:   To identify if e-learning is an effective delivery method for Carbon Literacy: Knowledge.

Objective 2:   To determine the effectiveness of CLK e-learning in motivating learners to take action on climate change.

Objective 3:   To determine attitudes towards the CLK e-learning.

1. Executive Summary

The report provides insight into the effectiveness of the 'Carbon Literacy: Knowledge' (CLK) e-learning package as a method of delivery for the Knowledge section of the Carbon Literacy Standard. Analysis of two surveys were undertaken, one prior to participants undertaking CLK e-learning (the 'pre-course' questionnaire) and the other once the e-learning had been completed (the 'post-course' questionnaire). Our analysis showed that CLK e-learning is an effective delivery method across all areas questioned (Figure 1). We show that the CLK e-learning is effective in motivating learners to take action on climate change (CC). Following on from the e-learning, participants are most likely to feel more aware, motivated, and positive. 94% of learners felt their attitude towards CC is either improved or reaffirmed by the information they encountered. 95% of learners felt either 'fairly' or 'very confident' in taking action within their organisation. 52% of participants commented that they found the course informative and/or enjoyable.

Perceived change in total level of participant knowledge on climate change, from before to after undertaking CLK
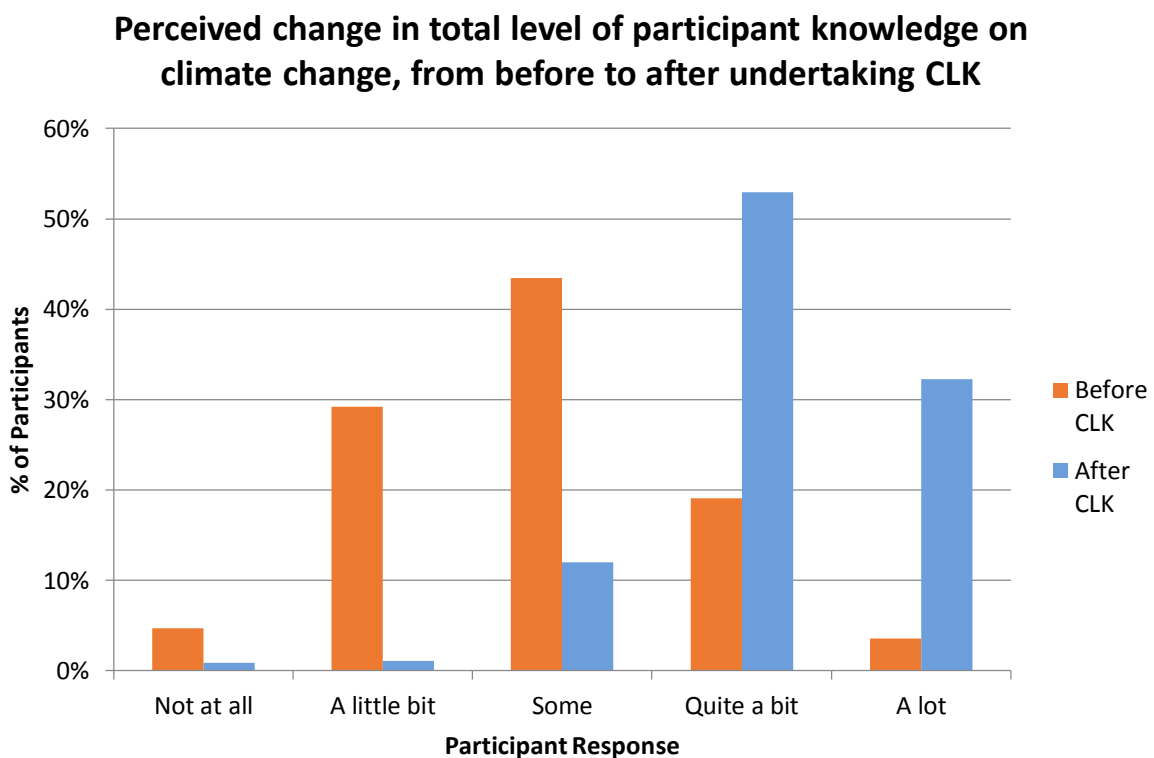
Figure 1: Perceived change in total level of participant knowledge on climate change, from before to after undertaking CLK.

2. Introduction

2.1. The Carbon Literacy Project

The Carbon Literacy Project (CLP) originated in Manchester in response to the city's climate action plan 'Manchester: A Certain Future'[1]; one of the key aims of which is -

> "*To engage all individuals, neighbourhoods and organisations in a process of cultural change that embeds low carbon thinking into the lifestyles and operations of the city.*"

The project offers a day's worth of Carbon Literacy (CL) training to everyone who lives, works or studies in Manchester and the wider area; allowing the project to capture all audiences within the city. CL training covers: the science behind climate change; social equity & climate change; acting on climate change, personally and professionally; and strategies and skills for communicating action on climate change.[2] It does this through 4 core elements outlined in the CL Standard – learning method; knowledge; values; and action.

More than just small personal changes, CL highlights the need for substantial change and supports learners, to have a cascade effect on a much wider audience – whether that be in a workplace, community, school, university, place of worship, or other setting.

The Carbon Literacy Project is unique in that there is no other project, working across all sectors to deliver culture change with a focus on climate change mitigation, anywhere else in the world.

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[1] Manchester: A Certain Future Steering Group. (2013) *Manchester: A Certain Future Update 2013*.

[2] Manchester Metropolitan University. (2017) *Carbon Literacy*. [Online] [Accessed on 7th March 2017] http://www2.mmu.ac.uk/bigimpact/sustainability-in-action/carbon-literacy/

2.2. Carbon Literacy: Knowledge

CLK was developed to deliver the Knowledge section of the CL Standard for all learners, regardless of audience, hence being called 'CL Knowledge'. CLK collates the latest scientific evidence and thinking from climate change scientists across the world. Wherever possible, all material is referenced back to the original sources, studies, webpages and other resources so learners can follow the information back to its root if they wish.

Because of the requirements of the CL Standard for learning to be relevant to the learners' own environment, courses are adapted and packed with specific information that will maximise help for learners in their own situation and setting. Expect facts, impacts, effects, case studies and signposting to further help and information, all customised so that it is tailor-made for learners from the relevant sector. Training must cover all of the following elements of the CLK criteria in order to be delivered as CL -

1: Greenhouse Gases: what they are, and their relationship to weather and climate;

2: How climate here and elsewhere is likely to change, and how we know this;

3: How changes in the climate are likely to affect us (in own country), and in other parts of the world;

4: How our actions impact on the amount of greenhouse gases produced, and the impact they have;

5: What we can do to reduce our impact, and the benefits and disadvantages of taking action;

6: What we are already doing locally and nationally;

7: Where we can go to get help. What help is available to us;

8: How we can motivate others to take action, including gaining the confidence to communicate our carbon literacy to others

2.3. E-learning

The CLK, E-learning Framework has been developed to assist organisations and trainers in delivering Carbon Literacy. The framework meets almost all of the requirements of the "Knowledge" component of the CL Standard.

The CLP worked in conjunction with the Virtual College to create the e-learning. As CL must be customised to be immediately relevant to its recipient audience, the e-learning has been adapted to suit the audience who will be participating in it. As a result, a number of "flavours" of CLK are available to audiences from the relevant sector. Currently these are –

1: Registered Providers of Social Housing (CL4RPs members and other housing associations)
2: Local Authorities (via The Carbon Literacy Project)
3: Fire and Rescue Services (via GMFRS)
4: Large Commercial Organisations (via The Carbon Literacy Project – in development)
5: Carbon Literate Citizens (via a consortium of community training organisations – in development)

The framework has been written in such a way as to allow regular updates by The Carbon Literacy Project to ensure that the quality of the information passed on to learners remains at the highest standard, and that the science is up to date.

Carbon Literacy requires an element of peer to peer learning and group enquiry within the course. As a result, organisations can use e-learning to provide the consistent foundation knowledge (often preceded by a short meeting or workshop to explain the significance of the training) and then follow it up with half a day of face to face work on issues relevant to that organisation, to meet the peer to peer and group enquiry and action requirements of the training.

2.4.   Survey

Two different questionnaires were carried out externally; one prior to undertaking CLK e-learning (pre-course questionnaire - questions 1-6), the other once the e-learning had been completed (post-course questionnaire - questions 1-10). Respondents came from a range of organisations, the only criteria being that participants must have completed the training prior to undertaking the second survey. This was met through an automated survey system when first logging into the training, then again upon completion.

The survey did not ask for demographics as this data would not benefit the study, as respondent answers were considered as a collective, rather than on a demographic basis. In total 265 individuals took part in the survey.

The survey consisted of both open and closed questions. Questions 1-6 were closed, respondents choosing from the options 'Not at all', 'A little bit', 'Some', 'Quite a bit' and 'A lot'. Questions 7-10 were open questions, and only featured on the post-course questionnaire. They allowed for participants to reflect more openly on the CLK e-learning itself, as well as to provide a greater level of understanding to any attitude changes observed.

Questions 1-5 identify if the e-learning is an effective delivery method for CLK. It does this through direct comparison and analysis between the data collated from the pre- and post-course questionnaires.

Question 6 determines the effectiveness of CLK e-learning in motivating learners to take action on climate change. It does this through direct comparison and analysis between the data collated from the pre- and post-course questionnaires.

Questions 7-10 determine attitudes towards the CLK e-learning. These questions only feature on the post-course questionnaire as completion of the CLK e-learning is needed in order to have a comprehensive understanding of the course itself.

Q1 - How much do you feel you know about the issue of climate change?

Q2 - How much do you feel you know about the causes of climate change?

Q3 - How much do you feel you know about the impacts that climate change is having?

Q4 - How much do you feel you know about the benefits to you of taking action to reduce or prevent the worst effects of climate change?

Q5 - How much do you feel you know about what action is already being taken around you to reduce or prevent the worst effects of climate change?

Q6 - How motivated do you feel to take action to reduce or prevent the worst effects of climate change?

Q7 - Having now successfully completed this Carbon Literacy: Knowledge module, how do you feel?

Q8 - How have your attitudes changed on the basis of the information you've encountered so far?

Q9 - Assuming that your organisation continues to give you the support to do so, how confident are you of taking action in your organisation, as a consequence of what you've just learned?

Q10 - What other comments do you have?

3. E-learning as an Effective Delivery Method of CLK

3.1. Q1 - How much do you feel you know about the issue of climate change?

Perceived change in participant knowledge on the issues of climate change, from before to after undertaking CLK

Figure 2: Perceived change in participant knowledge on the issues of climate change, from before to after undertaking CLK.

Before undertaking the CLK e-learning, the modal response was 'Some' with 40% (Figure 2). After the modal response was overwhelmingly 'Quite a bit' with 55% (Figure 2).The distribution of the data has shifted from a central position before, towards 'A lot' after (Figure 2).

This suggests that participants feel that they have a good grasp on the issues of CC, but that they feel that there is more still to be learnt. As CLK e-learning is required to be relevant to the learning environment, this aligns with the idea that learners would not know everything about CC as the focus has been on a certain industry or sector.

3.2. Q2 - How much do you feel you know about the causes of climate change?

Perceived change in participant knowledge on the causes of climate change, from before to after undertaking CLK
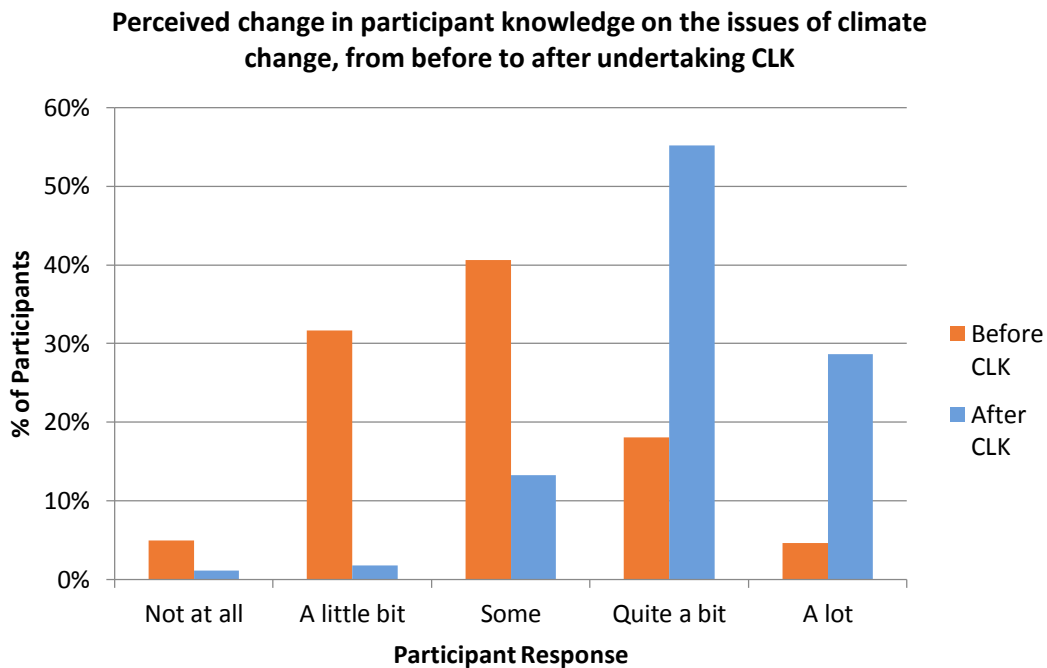

Figure 3: Perceived change in participant knowledge on the causes of climate change, from before to after undertaking CLK.

Before undertaking the CLK e-learning, the modal response was 'Some' with 43% (Figure 3). After the modal response was overwhelmingly 'Quite a bit' with 52% (Figure 3). The distribution of the data has shifted from a central position before, towards 'A lot' after (Figure 3).

This demonstrates that the CLK e-learning alone has improved learner's knowledge of the causes of climate change.

3.3. Q3 - How much do you feel you know about the impacts that climate change is having?

Perceived change in participant knowledge on the impacts of climate change from, before to after undertaking CLK
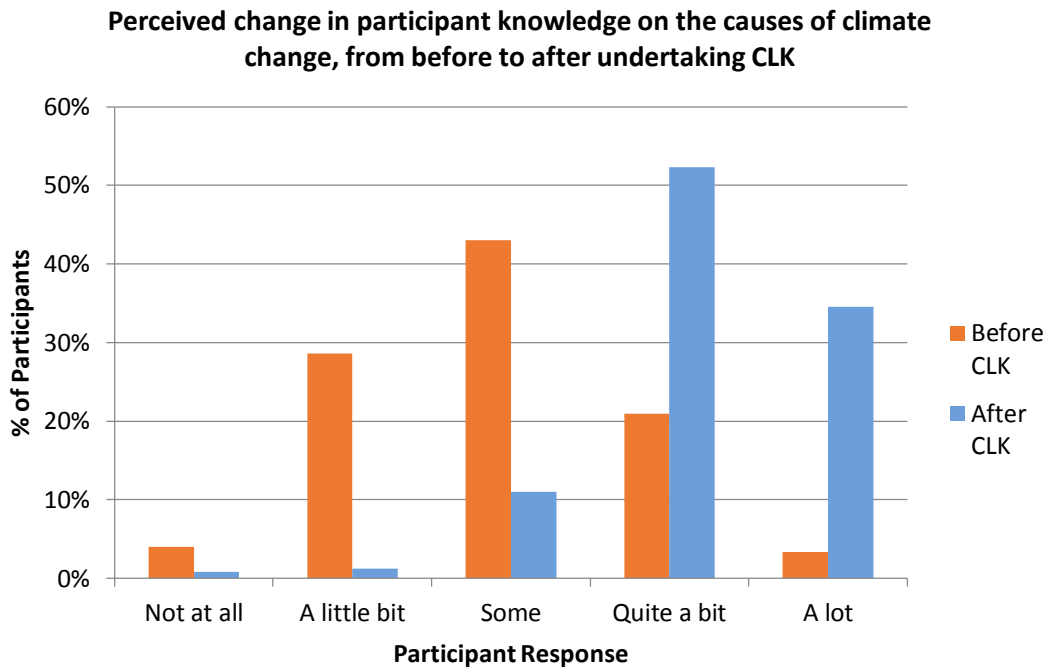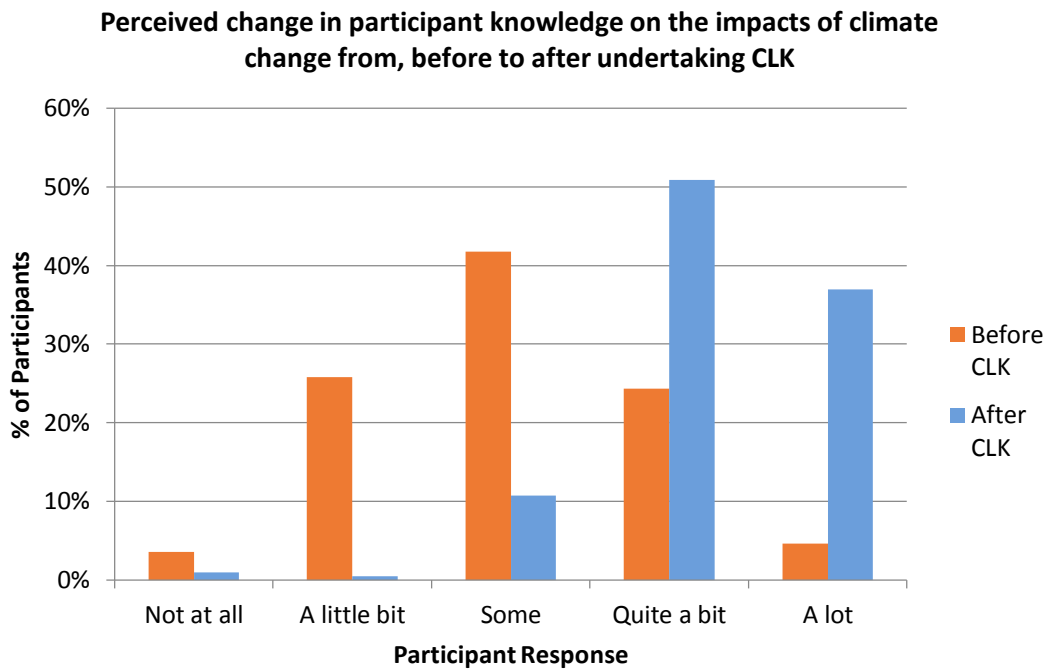

Figure 4: Perceived change in participant knowledge on the impacts of climate change, from before to after undertaking CLK.

Before undertaking the CLK e-learning, the modal response was 'Some' with 42% (Figure 4). After the modal response was overwhelmingly 'Quite a bit' with 51% (Figure 4). The distribution of the data has shifted from a central position before, towards 'A lot' after (Figure 4).

The CLK e-learning has improved how much participants feel they know about the impacts of climate change.

3.4. Q4 - How much do you feel you know about the benefits to you of taking action to reduce or prevent the worst effects of climate change?

Perceived change in participant knowledge on the benefits of taking action against climate change, from before to after undertaking CLK

Figure 5: Perceived change in participant knowledge on the benefits of taking action against climate change, from before to after undertaking CLK.

Before undertaking the CLK e-learning, the modal response was 'Some' with 44% (Figure 5). After the modal response was overwhelmingly 'Quite a bit' with 50% (Figure 5). The distribution of the data has shifted from a central position before, towards 'A lot' after (Figure 5).

This shows that learners have increased how much they feel they know about the benefits of taking action to reduce or prevent the worst effects of climate change, as a result of undertaking the CLK e-learning.

3.5. Q5 - How much do you feel you know about what action is already being taken around you to reduce or prevent the worst effects of climate change?

Perceived change in participant knowledge on the action already being taken against climate change, from before to after undertaking CLK
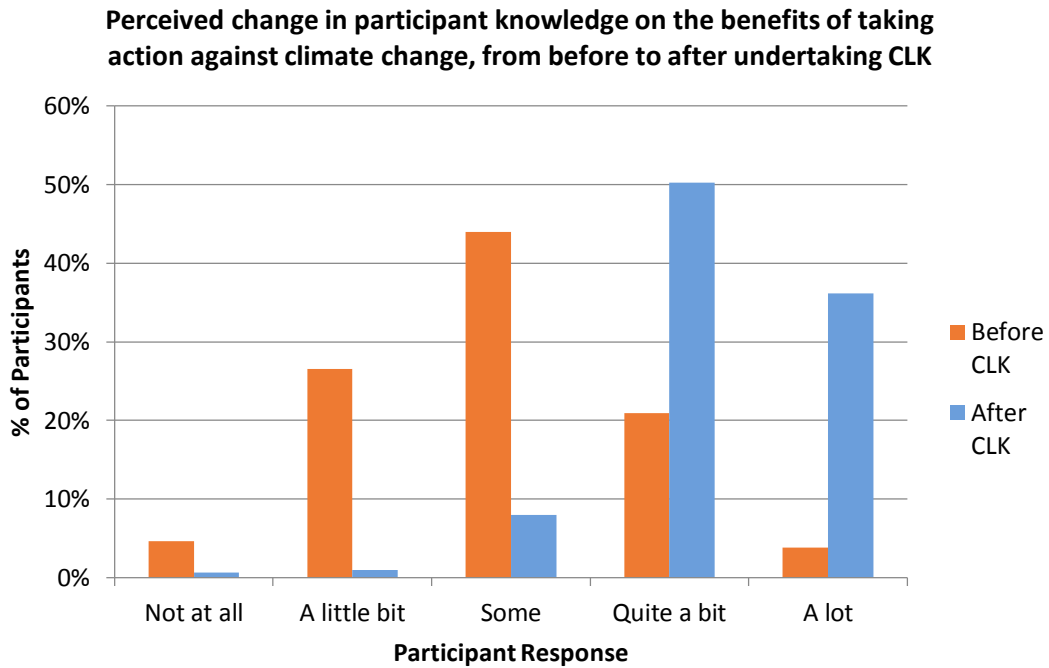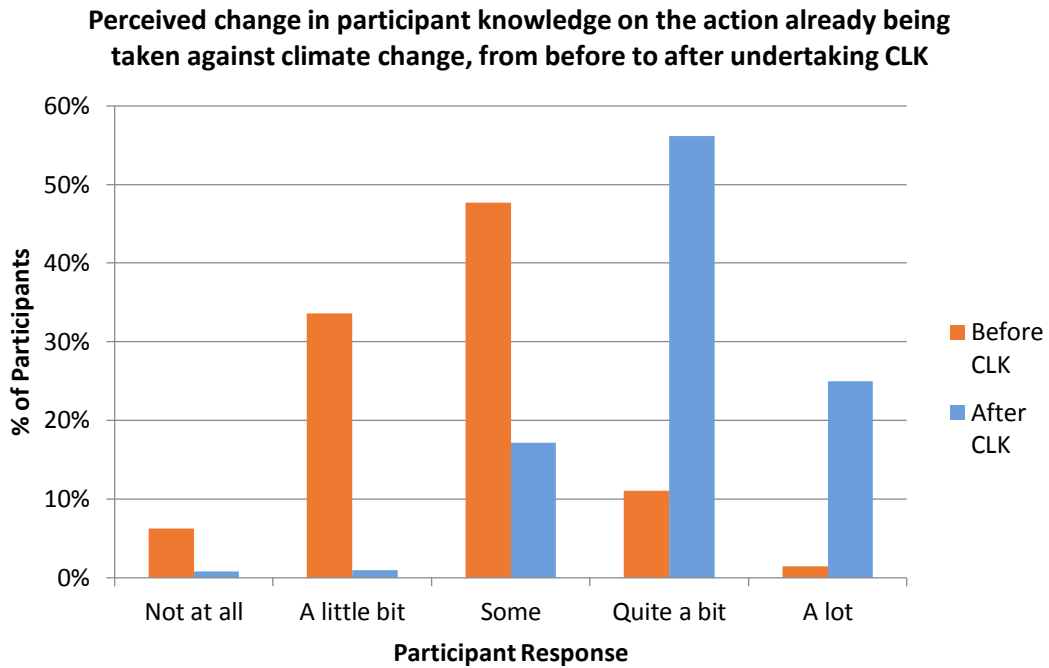

Figure 6: Perceived change in participant knowledge on the action already being taken against climate change, from before to after undertaking CLK.

Before undertaking the CLK e-learning, the modal response was 'Some' with 48% (Figure 6). After the modal response was overwhelmingly 'Quite a bit' with 56% (Figure 6). The distribution of the data has shifted from a central position before, towards 'A lot' after (Figure 6).

Respondents' knowledge about what action is already being taken around them to reduce or prevent the worst effects of climate change has increased as a result of the CLK e-learning.

4. Motivating Learners to Take Action on CC

Q6 - How motivated do you feel to take action to reduce or prevent the worst effects of climate change?
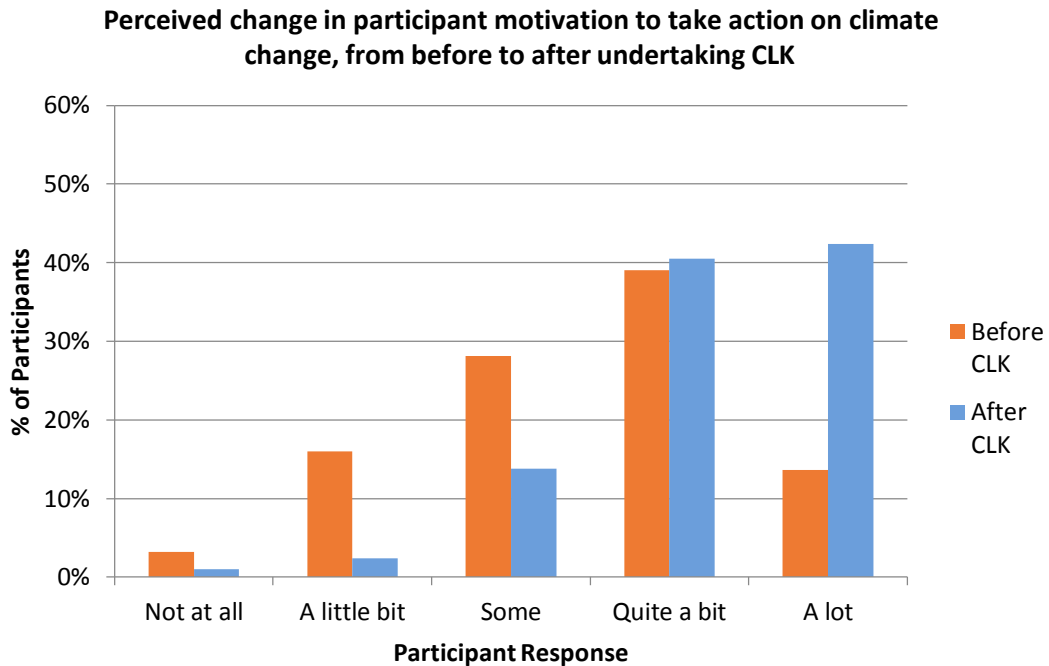
Figure 7: Perceived change in participant motivation to take action against climate change, from before to after undertaking CLK.

Before undertaking the CLK e-learning, the modal response was 'Quite a bit' with 39% (Figure 7). After the modal response was overwhelmingly 'A lot' with 42% (Figure 7). The distribution of the data has shifted from a central position before, towards 'A lot' after (Figure 7).

Participant motivation to take action to reduce or prevent the worst effects of climate change was already high before undertaking the course. After, as a result of CLK e-learning, motivation had increased further.

Q9 - Assuming that your organisation continues to give you the support to do so, how confident are you of taking action in your organisation, as a consequence of what you've just learned?
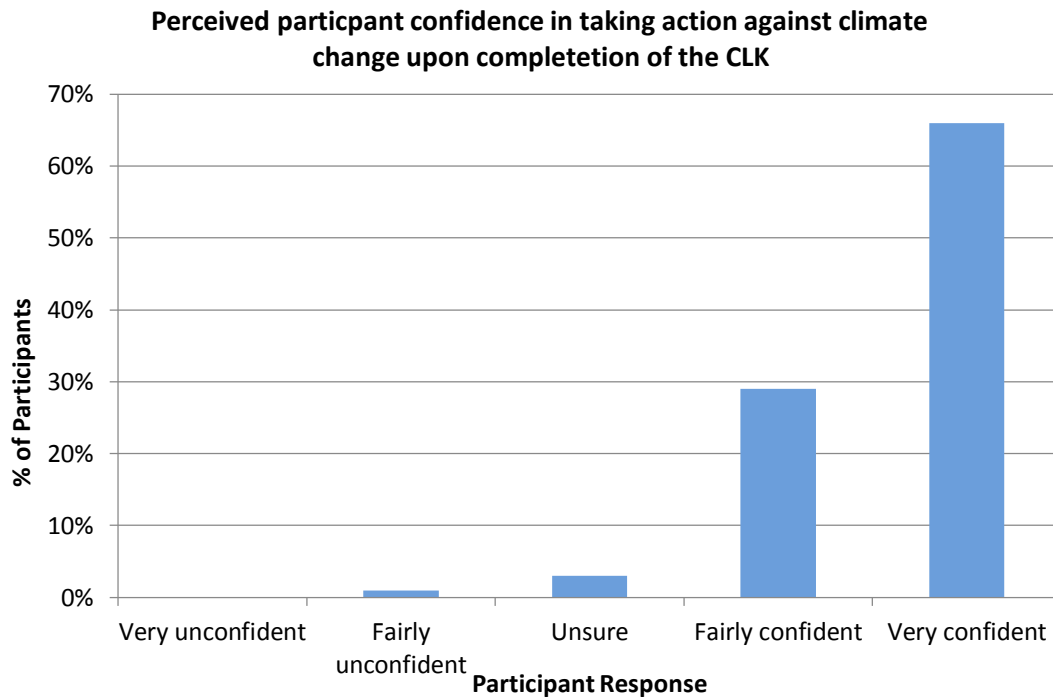
Perceived particpant confidence in taking action against climate change upon completetion of the CLK

Figure 8: Perceived participant confidence in taking action against climate change upon completion of the CLK.

Overwhelmingly, 95% of participants stated that they were either 'very' or 'fairly confident' in taking action within their organisation as a result of undertaking the e-learning; assuming the organisation continues to support the individuals and the instilling of Carbon Literacy across the organisation (Figure 8). The vast majority of learners (66%) stated that they were 'very confident' in taking action (Figure 8).

No learners were 'very unconfident' following the e-learning and only 1% felt 'fairly unconfident'; suggesting that the course is majoritively effective. When paired with the second, face-to-face, session and the individual has undertaken the "one full day's worth of learning", most participants would be confident to take action within their organisation.

5. Attitudes Towards CLK E-learning

Q7 - Having now successfully completed this Carbon Literacy: Knowledge module, how do you feel?

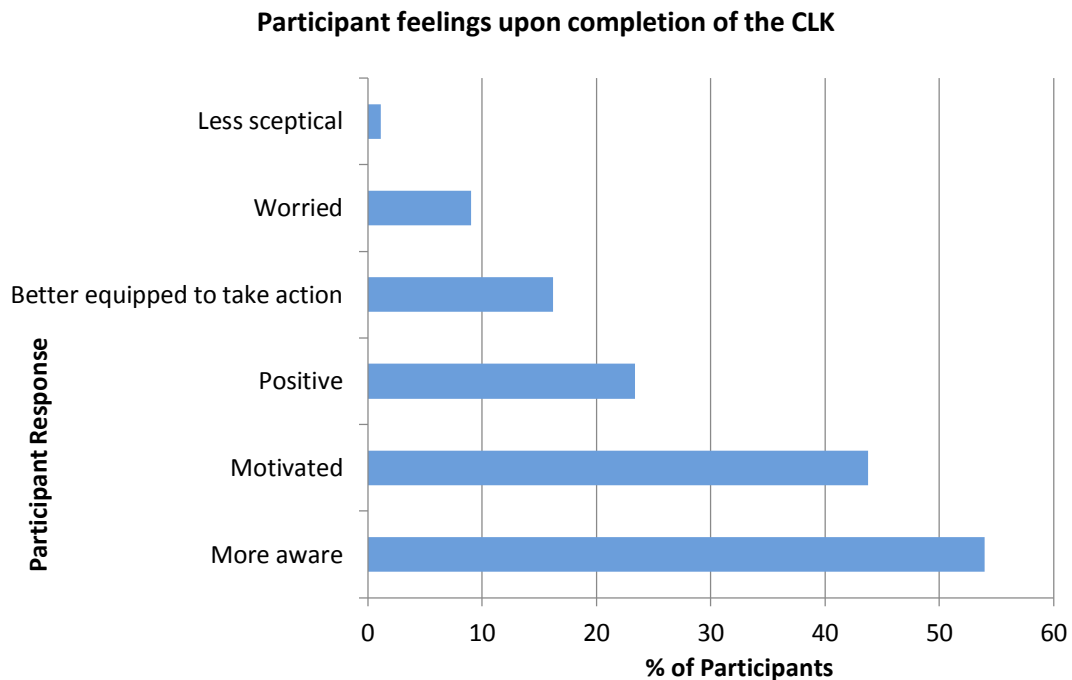**Participant feelings upon completion of the CLK**

Figure 9: Participant feelings upon competition of the CLK.

Figure 9 shows that:

1% of participants felt less sceptical about CC - "*I thought the warming of the earth's temperature was a natural cycle. After completing this course I am not too sure, and think we are to blame for it.*"

9% felt worried about CC, particularly if we do not act – "*a lot of world leaders don't take this huge issue seriously enough. It should be at the top of every countries agenda!*"

16% felt better equipped to take action, and to get others to take action as a result of the e-learning – "*I now know enough to talk to people and hopefully influence their decisions.*"

23% felt positive about CC, knowing they can mitigate it – "*if more people do this [course], awareness and acceptance will begin to have more hold and we can change things together.*"

44% felt motivated to take action on CC – "*I am now able to actively contribute in solving this issue.*"

54% felt more aware about the impacts of CC, and what they do to limit its effects – "*I feel fully aware about how [CC] will affect us, and what we can do to prevent it from developing further.*"

Q8 - How have your attitudes changed on the basis of the information you've encountered so far?
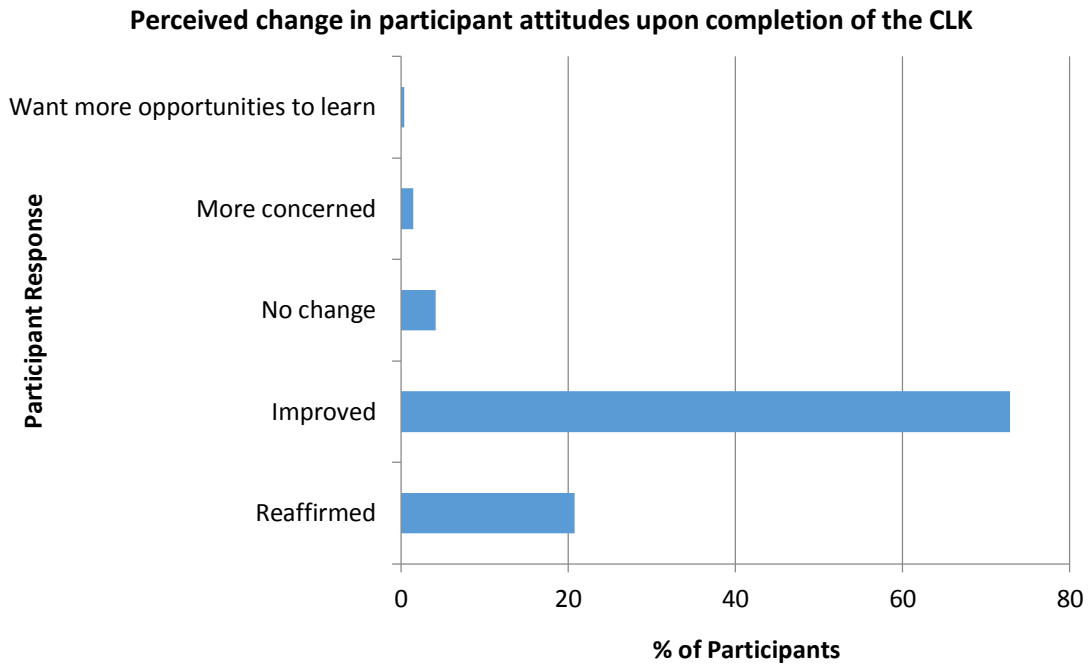
Perceived change in participant attitudes upon completion of the CLK

Figure 10: Perceived change in participant attitudes upon competition of the CLK.

93% of learners felt that their attitude has either been improved or reaffirmed as a result of the CLK e-learning (Figure 10). These feelings were supported by comments that the knowledge either gained or revisited had made participants eager to do more.

"[It's] given me an increased sense of urgency to make changes"

"I knew climate change was important and a serious issue but I never knew how severe the problem of climate change was"

"I knew before the course there were some things that I could do to take action, but now I know a lot more things I can do"

"My attitudes haven't changed but I do feel far better informed and hopefully better able to encourage others to also play their part"

"[It] has encouraged me to do more and encourage others to live more sustainably"

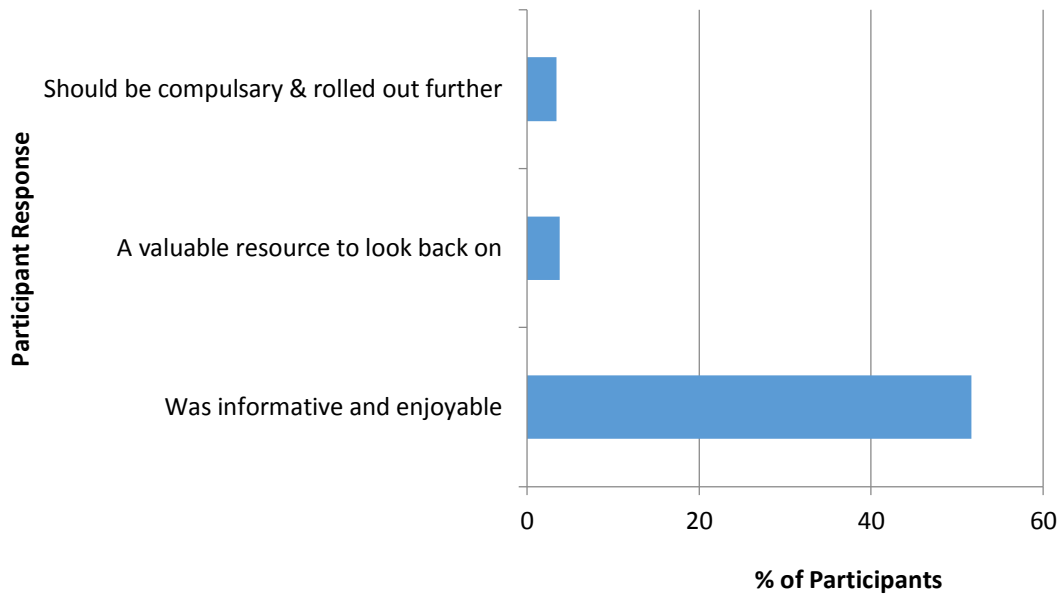**Other comments about the course itself upon completion of the CLK**

Figure 11: Other comments about the course itself upon competition of the CLK.

Figure 11 shows that:

52% of participants commented that they found the CLK e-learning "*informative and enjoyable*".

Other positive comments were that 4% of individuals felt the e-learning was a "*valuable resource that could be looked back over in the future to reinforce [their own] knowledge*".

3% of participants expressed a strong desire for Carbon Literacy, and specifically the CLK e-learning, to be "*compulsory*" across all age groups, and for the "*roll-out to be scaled up*".

Areas for improvement were also highlighted.

6. Suggested Improvements

Minor grievances about user experience were reported by a couple of participants. These have been deemed as minor due to the nature and small volume of grievances reported. Suggestions to improve the user experience of the CLK e-learning have been devised for further exploration, should The Carbon Literacy Project and Virtual College see fit.

Feedback	Current reasoning	Suggestion
The audio is too slow	Needs to be a speed that all learners can understand and take in	Development of various speed modes
Screen transitions were too slow	Needs to be a speed that all learners can understand and take in	Development of various speed modes
Unable to download content as a resource	CLK e-learning is bought as an individual specific resource	Links to downloadable, open-access resources at the end of each section
Currently there aren't 'flavours' of the course for every industry	E-learning is developed as industries buy into CL	CLP to actively develop links with a wider range of industries
Uncertainty of what must be clicked on to progress	-	Highlighting / outlining for clarity
Section 5 was quite long	A lot of content and took a while to work through	Split section 5 into two sections

7. Conclusion

This report has provided insight into the effectiveness of e-learning as a delivery method for the CLK section of Carbon Literacy. E-learning was identified as an effective delivery method for CLK. CLK e-learning was determined to be effective in motivating learners to take action on climate change. Overall, attitudes towards the CLK e-learning were determined to be overwhelmingly positive –

"This is the best learning experience I think I have ever had!"

"[I] found the course very informative and [it] really shifted my thinking on this topic. [It's] enabled me to provide better leadership around change for my organisation."

"This was a very informative and enjoyable module to follow, and its explanations and science readily understood by someone with little scientific knowledge."

"Carbon Literacy training is the environmental education our community needs in order for my generation (the people who have the time and power to make a change) to learn about climate change and what we can do to help make our world healthy again."

Six improvements to the e-learning were suggested as a direct result of participant feedback.

The CLK e-learning constitutes half of a Carbon Literacy course, requiring one full day's worth of training. When paired with the face-to-face segment of CL, it is expected that the positive effects on learners, in motivating them to take action on climate change, will be multiplied.

"We cannot solve our problems with the same thinking we used when we created them."
- Albert Einstein

June 2017