

Microscope Activity Kits: Impact Study

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Contents

Introduction	1
Methods.....	1
Impact.....	2
At the RMS	2
In Schools	4
Through Other Organisations	10
At Oxfordshire Employment	13
Future Aspects.....	17
Publication and Organisational Effectiveness	17
Improvements in the Kits	18
Acknowledgements.....	19
Personal Reflection	19



With thanks to:



Introduction

The Royal Microscopical Society (RMS) has, since 2011, been operating a project by which the society sends out Microscope Activity Kits (MAK) to UK primary schools free of charge. These kits contain eight microscopes, a mountable digital microscope along with samples and associated activities (<https://goo.gl/Z2W4MC>). Schools are able to borrow these kits for a term at a time and this is organised and administered by staff at the RMS. Schools simply order the MAK online and the rest is arranged for them.

This report has been produced as part of a three month professional internship for PhD students (PIP). Though operational details regarding the MAK project will be included, the primary focus is 'impact'. This particularly broad term refers to all the benefits to all parties associated to the project. As such, below is a comprehensive assessment of the impact on schools, the RMS and other partner organisations. The aim throughout this report is to highlight the impacts that the kits have had through various mechanisms and follow this information up with suggestions of how to maximise impact.

Methods

Impact on the RMS and other organisations has been reviewed by semi-structured, informal interviews conducted via telephone or in person as appropriate. Initial questions were put together to lead informal conversation through which subjects were able to give detailed descriptions of how they had been affected by the MAK project and their views on how each organisation had been impacted overall. These conversations were not recorded but notes were taken throughout and the initial write ups for each organisation were reviewed by the subjects for opportunity to comment. Additional data were collected from online sources including social media sites and organisational websites.

Impact on schools was assessed through a combination of sources. An initial questionnaire delivered alongside the kits was transposed into Excel by identifying particular themes in the mainly text based answers elucidated by the questionnaire. This was supported by a comprehensive questionnaire with more directed questions regarding impact. The enhanced questionnaire was designed in conjunction with RMS staff, a local teacher and a head teacher via personal communication with these individuals. Once the appropriateness and scope of the questionnaire had been finalised it was delivered online via the Google Forms platform to all schools that had received and returned the kits. Data was collected and collated automatically. It was then processed in Excel. Additional data was also collected from publicly available information regarding the schools involved so far.

Impact

At the RMS

It is from the RMS that the MAK project stems. There was Council driven support for the creation of an Outreach Committee. The Chair of this committee at the time, Dr Susan Anderson, suggested the idea of loaning out kits and drove the design and implementation of the MAK project. In 2010 the microscope activity kits were rolled out on a small scale with five kits but, following positive feedback, this quickly grew to its current size at fifty kits as it has remained since launching the current version of the kits in late 2012. They have now been to around 600 schools or education groups (see Figure 1).

Through both the inception and evolution, the RMS has been impacted in several ways. Firstly, the financial burden is significant. Each kit cost £750 to set up and costs £250 each year to maintain, this works out at more than £20000 since the expansion of the project. This doesn't take into account the staff hours associated to ongoing operation. However, this burden may be seen as an asset for demonstrating the charitable nature of the society. Secondly, the staff and their workload is another consideration. In the initial stages, the project presented itself as an opportunity for RMS staff to be involved, expanding their awareness and experience base. This has since developed into a designated part of a permanent role. The creation of the MAK project therefore provided cultural impact within the society where a new activity was adopted and allowed to evolve into a permanent role.

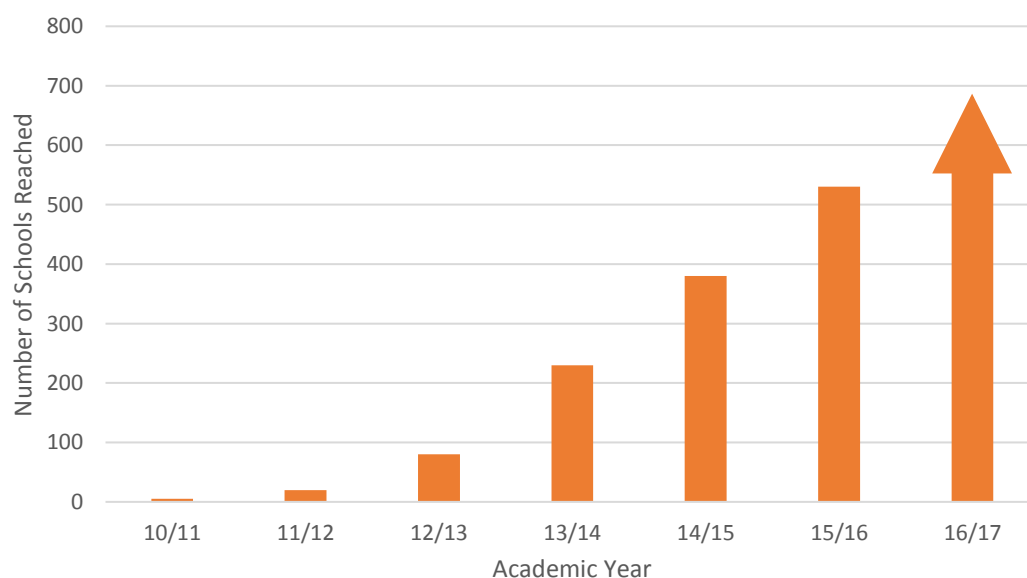


Figure 1. There were initially 5 Microscope Activity Kits which was expanded to 50 for a launch in late 2012. These were each loaned out for a term at a time with the number of schools reached increasing accordingly and increasing further into the future.

Most notably, the society has been impacted through increased public awareness of the RMS and its activities. Whereby many scientists in the field of microscopy may naturally be aware of the society, the general public may not. The MAK project has enabled public engagement with the society through a variety of channels. Advertising of the project is via event attendance and other means (eg. Gloucester SchoolsNet – <https://goo.gl/mRqs2L>) Communication regarding project logistics is performed by email predominantly with phone calls where necessary and has resulted in very positive relationships with a large number of schools. Public demonstrations of the kits at local and national events are attended regularly and often draw significant attention of which there is evidence for direct conversion into loans. These events have been in the form of educational sessions in addition to professional networking events. The kits have become the focus for the RMS attendance at many of these occasions (See Figure 2) where a more standard stall with leaflets might have previously been used. These events are often publicised but there is no central recording of this (Eg. ASE Conference Example – <https://goo.gl/QFAhYX>, Inverness Science Festival – <https://goo.gl/zmBYY4>, WCSIM Anniversary of Micrographia – <https://goo.gl/9Hv8hY>).

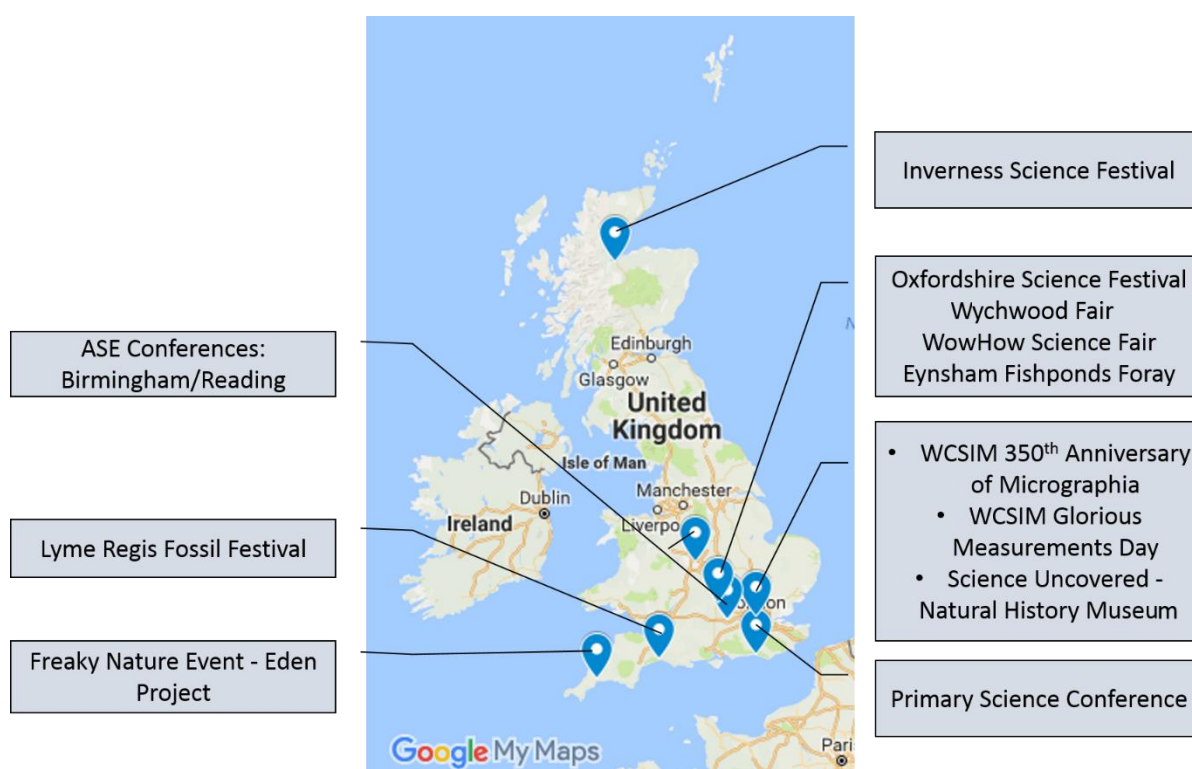


Figure 2. The MAKs have been demonstrated and used at events around the UK. The aims of these events have included those with an educational purpose as well as those based on professional development and interaction.

There is also the increased online/social media interaction. The Facebook page associated to the MAK project now has more than 170 'likes' and a recent post reached more than 700 people ([@microscopeactivitykit](https://www.facebook.com/microscopeactivitykit)). All these elements demonstrate dynamic

communication of the activities of the RMS to the general public because of the MAK project, raising awareness of both the society and microscopy. This increased public awareness was recently demonstrated with a Point of Light Award which was accepted on behalf of the RMS by Tony Wilson in November 2014. This award is given daily by the office of the UK Prime Minister for inspirational volunteer work and was awarded in this instance as recognition of the successful development of the MAK project (<https://www.pointsoflight.gov.uk/2739-2/>).

Though staff at the society readily comment on the positives and this is set to continue, there appears to be little effect on the membership. There has been a feature in the society's 'infocus' magazine which may have made the membership aware (Issue 41 March 2016, p52-55) of the project. This could form a focus of improvements to the project for further benefitting the RMS. Other methods for maximising the positive impact at the RMS would revolve around increasing public awareness and involvement in the project. This would include seeing the kits at more schools and events alongside the recording of this. Additional efforts would have to take the negative implications of financial burden and increased workload into account and minimise where possible.

In Schools

Schools are the main target of the MAK project. The kits are designed to be taken into schools for teachers to use to enthuse, inspire and teach. There is a clear focus on science but cross-curricular application was always an aim to enhance overall knowledge about the application of microscopy. Students should be regarded as the main beneficiaries but teachers and schools overall have been significantly impacted.

The impacts seen in schools have also been amplified by other organisations, the PSTT, AMBER and EXPLORE (via 'Under the Microscope'), which have adopted the kits into their own programmes. Impact for all these parties has been assessed through a combination of questionnaires and direct communication (as described above).

Students

The most important of impacts are the positive benefit to knowledge and engagement. Improving these was the primary aim of the MAK project being introduced. As is shown in Figure 3, >99% teachers reported improved scientific knowledge and skills with 26.1% and 32.4% respectively actually reporting these as greatly improved. Nearly 70% teachers reported that non-scientific skills were also improved or greatly improved (N=109). Engagement received a similar benefit. This was also sub divided to assess the engagement of pupils across different characteristics.

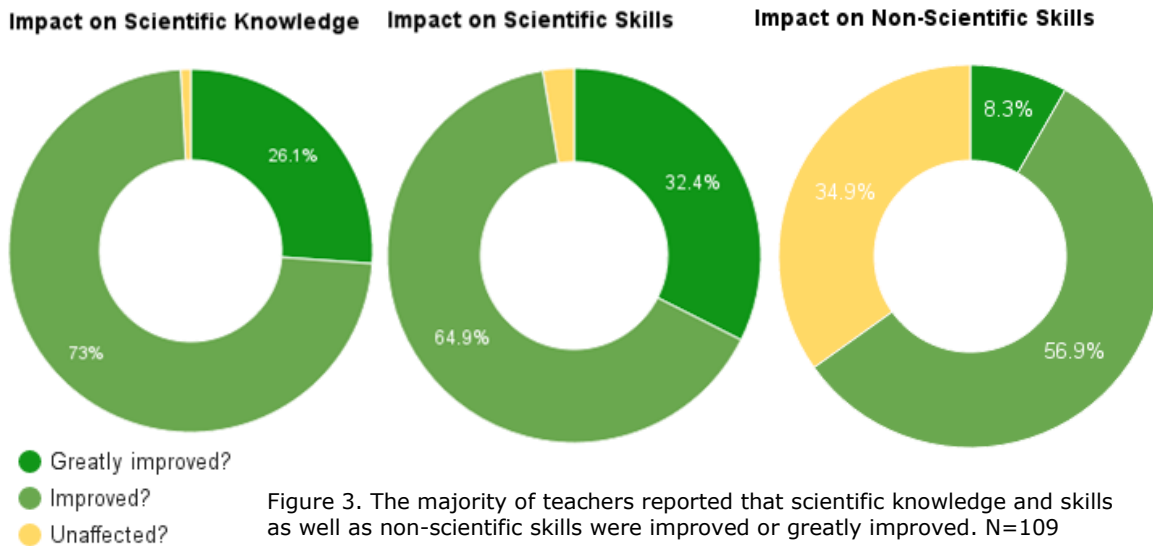


Figure 3. The majority of teachers reported that scientific knowledge and skills as well as non-scientific skills were improved or greatly improved. N=109

Figure 4 demonstrates that many of the different groups demonstrated increased engagement. Those that were most positively affected were SEN and disruptive students but increased engagement was observed across the board. The translation of this increased engagement into willingness to record information was also tested. Many teachers reported that the various student characteristic groups were unaffected in terms of their willingness to record but where there was change it was positive in the vast majority of cases (see Figure 5). More than half of teachers reported that the increased engagement and willingness to record also persisted after lessons involving the microscopes.

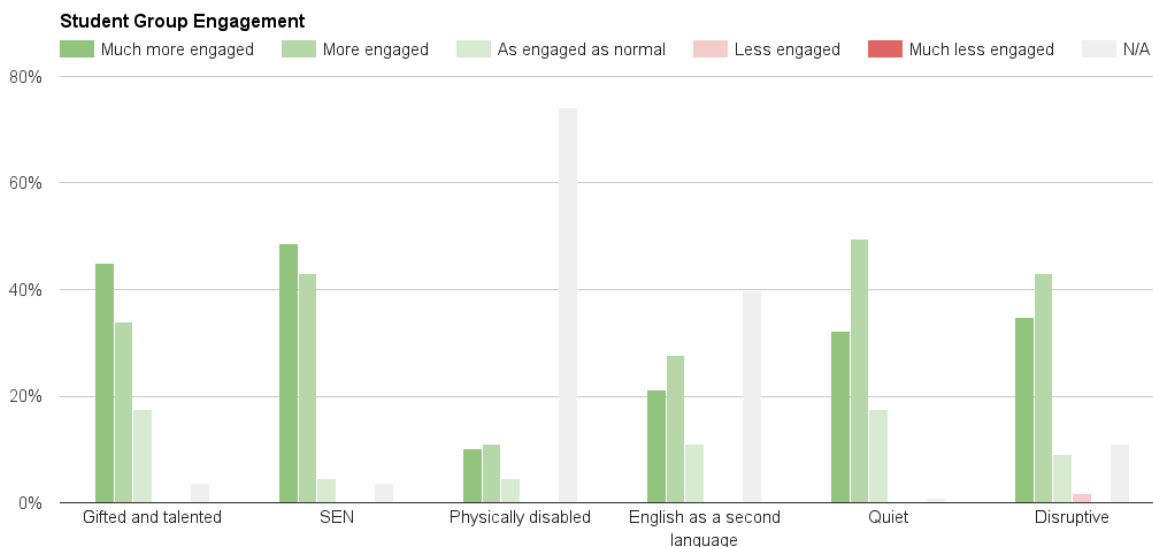


Figure 4. Student groups of particular characteristics showed improved engagement. This was reported by teachers who observed much more engagement or more engagement in many cases across a number of different characteristics. (N=109)

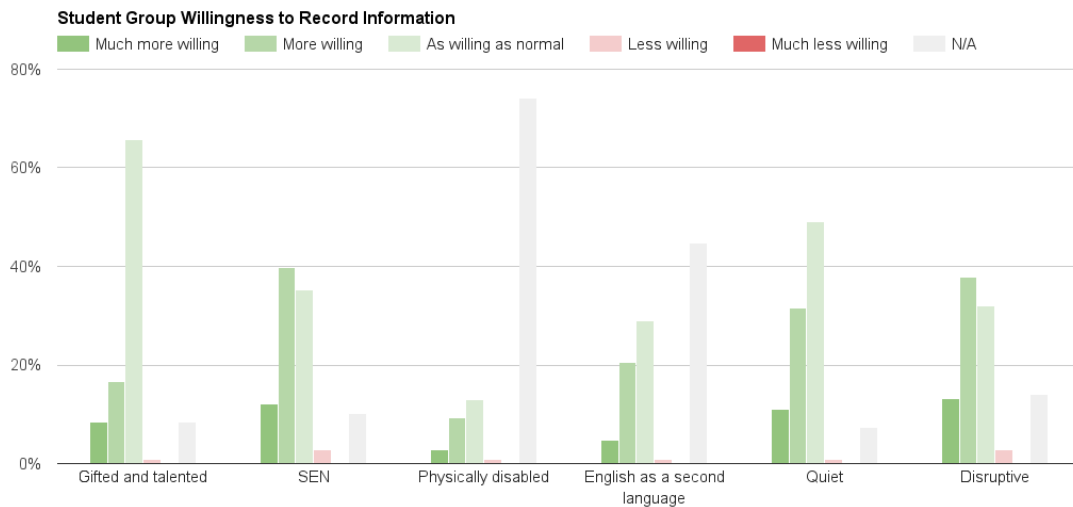


Figure 5. Improvement in willingness to record information was less pronounced. Many teachers did not observe an improvement but where there was a change, it was positive in the vast majority of cases. (N=109)

The impact on students is amplified by the size of the project. Well in excess of 50000 pupils have been reached across several hundred schools. These schools represent all areas of the UK and the full range of compositions in terms of size and proportions of SEN and disadvantaged (supported by the pupil premium) pupils (see Figure 6). Within schools there were examples where every year group had access to the kit. However, the more junior year groups appear to have been given access in fewer cases. In 1/3 schools access was boosted by use of the kits outside the context of a lesson. This often included science clubs, lunchtime access and workshops. Parents were often included in workshops. Despite the evidence of successful use of the kits outside the classroom, there were only two cases of the kits being used by an organisation other than a school through the main RMS outlet; a cub group and the Museum of Wales.

This method of teaching appears to be particularly effective in generating engagement. Importantly it is wide reaching and there are no particular concerns regarding the involvement of varying demographics or types of school. However, the information available regarding the advancement of knowledge and skills was limited to anecdotal observation as opposed to measurable benefit.

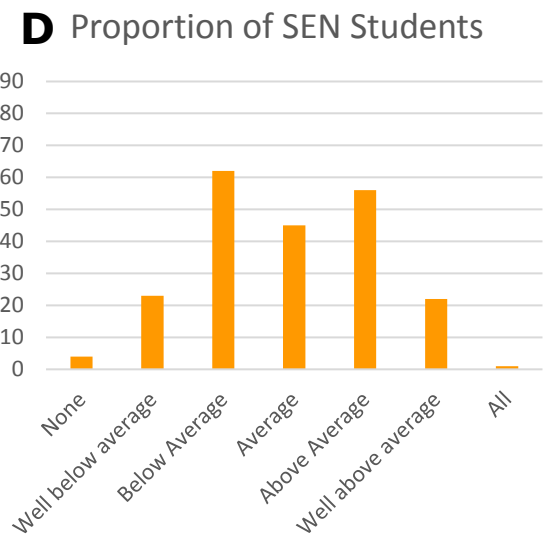
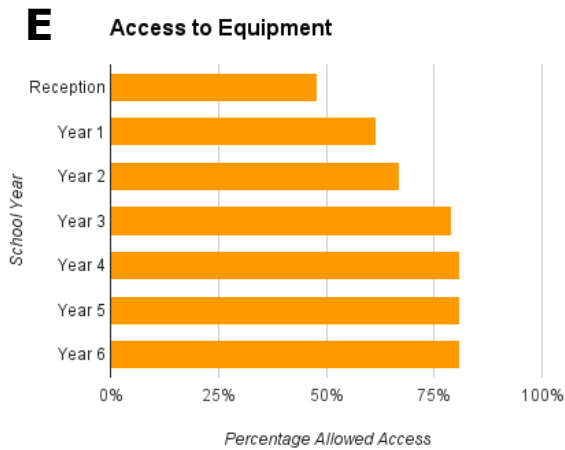
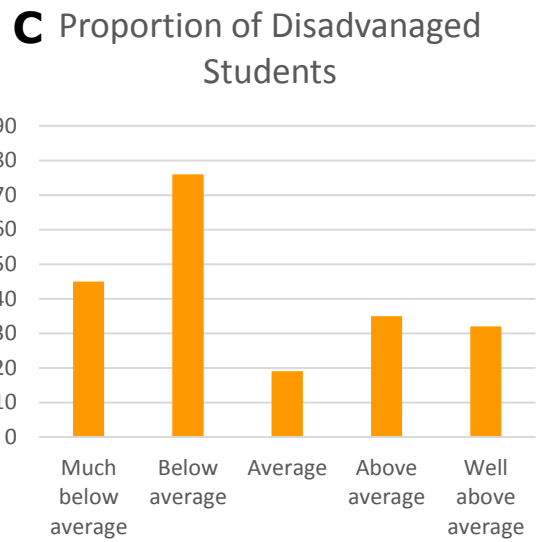
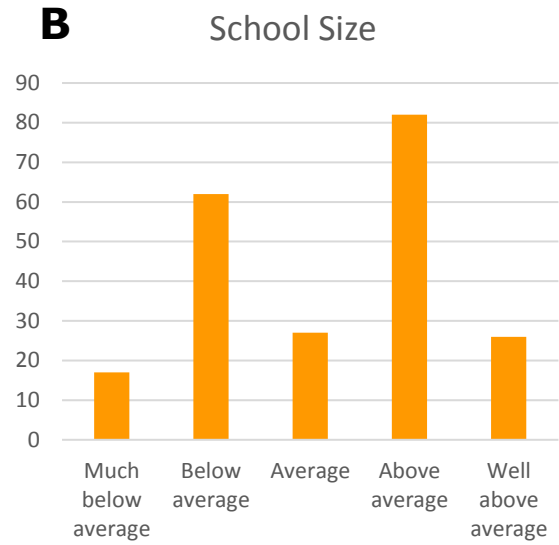


Figure 6. Access to the kits is available to all UK primary schools and the geographical distribution of kits so far reflects this (A). In addition, the schools reached include those of varying size and proportions of disadvantaged and SEN pupils demonstrating the all-inclusive nature of the project (B,C,D). Within schools, there is differing access to the kits between year groups (E).

Teachers

Teachers are both significant sources and recipients of impact for this project. They are responsible for ordering the kits which they appear to do for reasons broadly in line with the aims of the MAK project; 28% cited improving engagement, 18% boost scientific skills or knowledge, 27% to provide equipment not normally available. 16% of respondents were interested in using new activities and there were other reasons given in a limited number of responses (N=282) (see Figure 7).

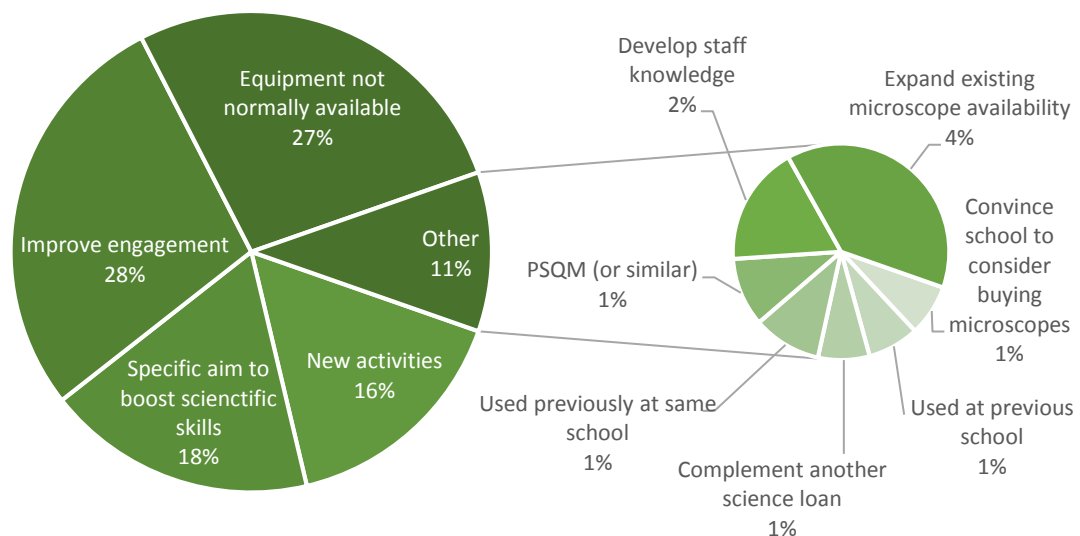


Figure 7. The most popular reasons for ordering the kits were to improve engagement (28%), provide access to equipment that would not normally be available (27%) and boost scientific skills (18%). These are in line with the overall initial aims of the MAK project. (N=282)

Following the delivery of the kit (on time 96% of occasions), most teachers found it easy or very easy to integrate them into their lesson planning with 62.7% agreeing that the activities actually saved them planning time (N=110). The vast majority also saw good or very good links to the primary curriculum and these are highlighted within the activities. The links have also been updated to reflect the newest curriculum. All activities rated highly but Activities 5 and 6 appeared to be used less than the more simple activities. Despite this, Activity 6 was chosen as a favourite by >40% of teachers (N=222). Significant reasons for choosing this activity compared to the others include the level of increased engagement, understanding of the applications of microscopes and the ability to further develop the students' skills.

Some teachers (9%) did not use the activities at all. This is a reflection of teachers who planned themselves new activities demonstrating that the kits provided them a new platform to base lessons on. These lessons have been made available online which also shows that these teachers became willing to share this work and collaborate in improving

the MAK project. These activities might also be perpetuated by microscope purchase which 25% of teachers reported having done (N= In the majority of cases where teachers did use the activities provided many also expanded into subject topic applications with mini-beasts and nature walks being popular. The use of the kits in lessons is quite an obvious impact and the use and popularity of each activity is an important consideration. However, teachers have seen other benefits in terms of their own development. Key impacts have been increased subject knowledge and opportunity to boost or demonstrate creativity which were reported by 56.3% and 91.7% of teachers respectively (N=103). This was amplified by the there being multiple users in more than half of schools. A significant proportion of teachers and head teachers (44%) were able to include the use of the microscopes in reports including those given to school governors.

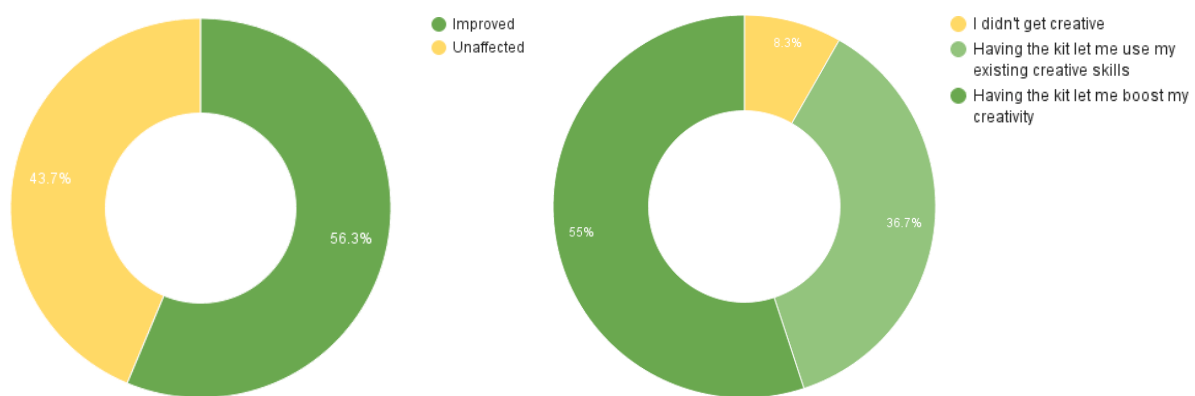


Figure 8. The majority of teachers (56.3%) reported that the MAKs helped improve their subject knowledge and the vast majority (91.7%) were able to use or boost their creativity because of the kits. (N=103)

Saving time and the ability to develop creativity and subject knowledge are probably key impacts for teachers. Although there is evidence that these are supported by the kits, there is most likely scope to improve these. A key part of this improvement should probably focus on cross-curricular engagement. Even where teachers designed their own activities or where there was focus topic application, these primarily focused on scientific skills and abilities. For each other topic area where activities could be provided the time saving, creativity and knowledge development applications mentioned above would be multiplied. This could form an interesting avenue for extension of the project in the future. Other improvements could more easily concentrate on maximising the existing impacts.

"The kit was excellent. Complete and comprehensive. Very easy to use for teacher and pupils alike. [The children] loved using them and making discoveries. They were surprised and delighted at the details they saw from unexpected sources."

Through Other Organisations

Other organisations have taken on the MAKs and been able to use them in support of their own projects. This is quite a distinct impact in itself. In addition to the impact of the kits on these external organisation and the positive feedback on the RMS, these other organisations also strengthen the main aims of the MAK project and provide interesting mechanisms for the ongoing application of kits in schools.

AMBER

Advanced Materials and BioEngineering Research (AMBER) centre, based in Ireland, planned outreach based on video call sessions between schoolchildren and people working in the field of nanomaterials in order to promote the students' understanding and awareness of this complex subject. They have also produced a toolkit for other organisations to do the same (<https://goo.gl/VcMLjz>). The project was supported by Science Foundation Ireland (SFI) and Microscope Society of Ireland (MSI) in addition to the input from the RMS. Lessons involving the MAKs were incorporated prior to the video calls and were attended by 6 schools. The aim of these were to boost the understanding students had regarding the basic principles of microscopy to be applied in the video call sessions. The aim was also to provide opportunity to explore the reasons behind the research being performed. The MAKs were therefore used to enable these sessions, making them vital to this particular activity: Science LIVE.

Impact on the students was assessed by questionnaires delivered to both them and their teachers. 83% of teachers agreed that Science LIVE encouraged their classes about science and all agreed this activity helped children see the application of science to everyday life. All the teachers also agreed that the MAKs would be a useful addition to their classroom and that they found them easy to use. Feedback from students was also very positive. After the sessions 81% of students felt they understood what materials are and 99% could use a microscope compared to 64% and 70% beforehand respectively. Interestingly, a slight decrease from 81% to 75% of children saying that they would like to speak to a scientist was observed.

Science LIVE appears to have been a success and MAKs have played a substantial role with beneficial impacts on both AMBER's programme overall and subsequently its beneficiaries. In addition, there was also the attitudinal change in AMBER where they now plan to use the kits again, not only in materials science but in other fields demonstrating the creation of a strong, international relationship facilitated by the MAK project. To pursue this they are in the process of acquiring more MAKs from the RMS. Importantly, this success and the future plans has been reported to the SFI.

PSTT

The Primary Science Teaching Trust (PSTT) is a College of Fellows with the aim of seeing excellent science teaching in every classroom at the primary level. The organisation has a membership of teachers who have all received a national award in reflection of their outstanding work to develop science in their own schools and beyond. Through this membership, the PSTT facilitates the development of primary science through raising the profile of primary science with the dissemination of ideas, resources and CPD (<https://pstt.org.uk/who-we-are/vision>).

It was originally formed as the AstraZeneca Science Teaching Trust in 1997 and run on a £20 million investment. The PSTT is now divided into 8 regions, each with its own mentor. The organisation has recently adopted the idea of forming school clusters for the delivery of its services which may provide an interesting opportunity for the application of the MAKs. The kits were demonstrated at the first PSTT conference and, despite a small audience, they were well received. Since then they have evolved into a considerable source of impact on and through the PSTT.

Arguably, the main targets for these impacts are school pupils. The PSTT uses the kits in schools in much the same way as is seen more widely with the MAK project though often with the guidance of a trained person. As such the impacts seen here are much the same but the records are mainly anecdotal comments that focus on increased engagement and new perspectives on everyday objects amplified by the inclusivity of all student groups. There are now plans to utilise a more robust evaluation process. Though the evidence for this impact is currently limited, the value of these benefits is nonetheless important. It is worth noting that the mechanism of impact is slightly different with the cluster format providing a more personal relationship with schools and also providing the opportunity for the kits to be applied in a bespoke manner without so much concern with regulated delivery and return times associated with the wider MAK project. For example, a school within a cluster would be able to request a kit from its partner schools for a science week or the whole cluster might be able to organise a joint outreach event if proximity allows. The kits have also had positive impacts for the PSTT as an organisation. They were used as part of a toolkit of activities that contributed to a successful bid for funds. The idea of being able to use the kits within a cluster has now evolved into a central theme for setting up new clusters. As part of this process, Peter Sainsbury has been seconded to the PSTT in order to provide training workshops for teachers that include the use of MAKs. Through this setup the PSTT ensures the kits are utilised fully. In addition to these events, other public events have also been boosted by the presence of the MAKs. These have provided a

"I have found that people who are good with primary science recognise a good resource ... and use it"

Peter Sainsbury, PSTT

platform for improving public awareness of the activities of both the PSTT and RMS. There are a number of additional upcoming events that will further these impacts and the continued evolution of the cluster model offers a fantastic opportunity for continuing provision of excellent science education.

Overall, the PSTT has both been beneficially impacted and also provided a platform for expanding the impact on schools and their pupils. This provides evidence that the kits can be useful to external organisations and also an interesting model for the application of kits in schools.

Under the Microscope

Over the last two academic years 'Under the Microscope' has been promoting STEM skills in primary schools across Ireland. It is run by Dr Kerry Thompson and Dr Alanna Stanley of the National University of Ireland, Galway. The programme uses MAKs alongside visits to schools (<https://goo.gl/2i0uEi>). The key impacts therefore occur in a similar fashion to the above programmes with the main targets being primary school pupils but the impacts on those involved in the inception, organisation and administration are unique.

Firstly then, there are the impacts relating to the formation of this project. Dr Kerry Thompson became aware of the MAKs via the website and, realising their potential, tried to find availability for Ireland. Seeing that they were only available in Northern Ireland, the decision was made to create an MSI/RMS partnership facilitated by Dr Thompson's position as Secretary for the MSI. During this time, the idea was communicated to Dr Stanley who shared the enthusiasm. The transfer of two kits from the RMS to the MSI was agreed and the project was initially supported by a successful funding application to the EXPLORE programme. This is run by NUI Galway to promote student/staff project collaboration. Since then the project has also received further funding from the MSI. Both Dr Thompson and Dr Stanley have therefore benefitted from the MAK project. They have been able to partake in enjoyable, career enhancing activities and have subsequently become great sources of impact themselves evidenced by recognition with funding and positive feedback on a project they remain hopeful to continue.

Secondly, those involved in the administration of the above and the continuing project have also been impacted. This includes both the RMS and the students involved with running the project. The RMS benefits from increased international recognition and a lasting relationship with the MSI in return for providing the MAKs. In addition, the RMS project benefits from an extra source of feedback as the close ties materialise in physical delivery of feedback in RMS Outreach meetings. The students involved through the student/staff collaborative nature of the EXPLORE funding and simply continued good practise have been impacted through a mechanism that is unique to the Under the

Microscope project. They have been able to be involved in outreach work during the final year of their undergraduate studies by going out with the kits to help schools during the four weeks each has access to the kit. As such, they have benefitted from a new experience that may help their employability and, even if nothing else, have had the chance to relax at a stressful time. Student involvement is now being expanded by the production of new instructional videos by PhD Students at NUI Galway.

Finally, the primary schools benefit quite considerably. Over the two complete academic years that the Under the Microscope project has been operational, 13 schools have been visited reaching more than 1200 pupils. What separates the Under the Microscope project from that run by the RMS is having a visit associated to the loaning out of the kits as described above. Though engagement was also observed as a result of this model, the visit also brought about a different mechanism for impact. All teachers agreed that this helped them become familiar with the kit and components with most saying that the visit was necessary to explain the kits. Confusingly, this was contradicted with the majority of teachers also saying that they would have used the kit regardless of whether the visit was included or not. This probably reflects the enthusiasm that was then demonstrated by a measured increase in willingness to carry out scientific experiments and even pursue the inclusion of these in their work as part of a CPD day if one was offered. This is particularly important considering that most of the staff did not have degree level science experience. Overall, interaction with the MSI through the 'Under the Microscope' has been and will continue to be beneficial to multiple parties.

[At Oxfordshire Employment](#)

The main impact of these kits is obviously aimed at schools but the logistics provider, County Print Finishers (CPF) as part of Oxfordshire Employment, is also notably impacted. They have provided logistical support for the MAK project for around three years with a relationship built up over this time based on a reciprocal appreciation of effort, flexibility and quality. Since the initial decision to use them as a service provider there is no doubt that they have been substantially impacted by involvement in the project.

CPF are responsible for receiving the kits, checking for damage/faults and the subsequent repacking for redelivery to the next set of schools as directed by RMS staff. The organisation is based on Oxford Business Park, in the locality of the RMS. There are twelve long term employees supplemented by a regular turnover of employees on six month contracts who aim to enhance existing employability skills in order to seek permanent employment as part of the mainstream workforce. CPF receive funding from Oxfordshire County Council in addition to the Department for Work and Pensions via Shaw Trust. As such they are charged with providing a platform for the provision of employment services

and support for those who may otherwise find mainstream work unsuitable due to a range of disabilities. Those in support of the MAK project are not the only services offered by CPF who also provide packing, printing and finishing services in addition to ISO accredited confidential waste disposal. Despite the valuable skills offered by partaking in these services, the breadth of tasks involved with processing the kits appears to offer an unparalleled capacity to involve employees of varying skill sets and aptitudes. The result of this is a host of beneficial impacts for both employer and employee which are discussed below following in-depth conversation with staff at CPF.

Impact on the business

One stream of impact on CPF created by the MAK project is that on the business overall.

"...it has opened our eyes"

*Andrew King, Oxfordshire
Employment*

The first element to consider is the financial benefits seen with a substantial boost observed in both the size and potential diversity in the commercial income stream. The business is not self-sufficient due to its very nature and requires government funding as mentioned above. However, due to universally increasing pressures on public funds there is a distinct possibility of this funding being reduced over time. A healthy commercial revenue stream is therefore important but may be difficult to maintain with a business model such as that seen with CPF. Companies of a similar nature have had to close due to reduced government funding. CPF feel that their involvement with MAK has helped them avoid this for two main reasons:

- Physical boost to funding by the RMS paying for the services received at a fixed price per kit.
- Developed an outward focus in terms of revenue generation with this attitudinal impact helping them establish and maintain a good commercial income.

There have also been a number of operational impacts mostly stemming from conceptual changes influenced by the MAK project. It has led the company to consider their capacity for different activities as being much greater than it may have been previously. In addition to the financial impact, this has also provided:

- Increased awareness of the different tasks they can include in their services. Eg. Quality control, more time consuming tasks (days vs hours) and stock management.
- Increased confidence and willingness to engage in new projects or extend existing ones (with logistical consideration). Eg. When the RMS requested additional checks be performed to address increasing damage to microscopes over time due to use,

CPF were willing to include these without additional cost by reflecting on the decreased time each individual check was taking due to staff experience.

- Better capacity to perform tasks by increased staff training opportunity which is both beneficial to CPF and future mainstream employers. Eg. Communication skill development which may not be possible with some other tasks where CPF benefits from increased efficiency and future employers benefit from employing staff with better rounded skills.

Overall, the impact of the MAK project on CPF as a business has been both broad and significant. There have been a number of impacts regarding the company's attitude and capacity as well as financial benefits.

Impact on the employees

The employees at CPF are, in general, challenged by mental or physical disability which may impair their ability to maintain employment. They often require significant support in order to gain the skills they need to work within the mainstream workforce and this support structure, whilst offering actual work, is what CPF provides. The effect that the MAK project has had on enhancing the delivery of this employment service is substantial due to both the diversity and significance of the individual impacts.

The impacts primarily revolve around the training that is made possible by the diverse range of tasks required to deliver the requirements of the MAK project. Compared to other services that CPF offers (eg. Envelope packing) the processing of the kits is both multi-faceted and longer lasting with a huge variety of small tasks contributing to the overall process that means employees of all abilities can be involved in some way. This has meant that training has been provided on the details of the kit content and purpose, increasing the awareness of the project and the understanding the employees have of the work they are doing. Most importantly though the complexity supports truly dynamic task appointment. For example, some staff members may be unable to handle the microscopes due to dexterity issues. In a simpler task this might mean there is simply no work that they can perform but the kits offer different tasks to be involved with. This particular staff member may instead be able to count petri dishes and collect new ones. Even smaller tasks can be broken down further. For example the above collection of petri dishes could challenge the cognitive ability of employees differently and some employees may be able to respond to a verbal request for more but the tactile nature means another staff member could be given a petri dish in order to bring back others that are the same. This level of task adaptiveness is unique to the kits. The complexity of the task brings in new training opportunities. For example, where another service (eg. Leaflet folding) may require minimal communication skills the kits require quite extensive communication skills to

develop for the task to be completed by somebody autonomously. As such the opportunity to develop this vital employment skill is provided by the kits naturally where it might otherwise be more difficult to incorporate. Communication is also encouraged to develop through team meetings where the kits provide a number of considerations that all employees are able to contribute to (eg. Where in the factory should the kits be stored). It is not only what the kits consist of that impacts staff training. Both how and when they are used also have effects. The shorter turnaround time associated to the Christmas holidays provides an excellent opportunity to increase the time pressures that staff experience providing an enhanced ability to handle a challenge that they will no doubt encounter in mainstream work. Additionally, the crates containing the kits provide an excellent health and safety training tool in terms of manual handling. Such training might normally be delivered by a presentation that would not necessarily be suitable for some of the employees. Instead, the training is timed to coincide with the kits being in the factory and the trainer is able to physically demonstrate and observe correct manual handling techniques.

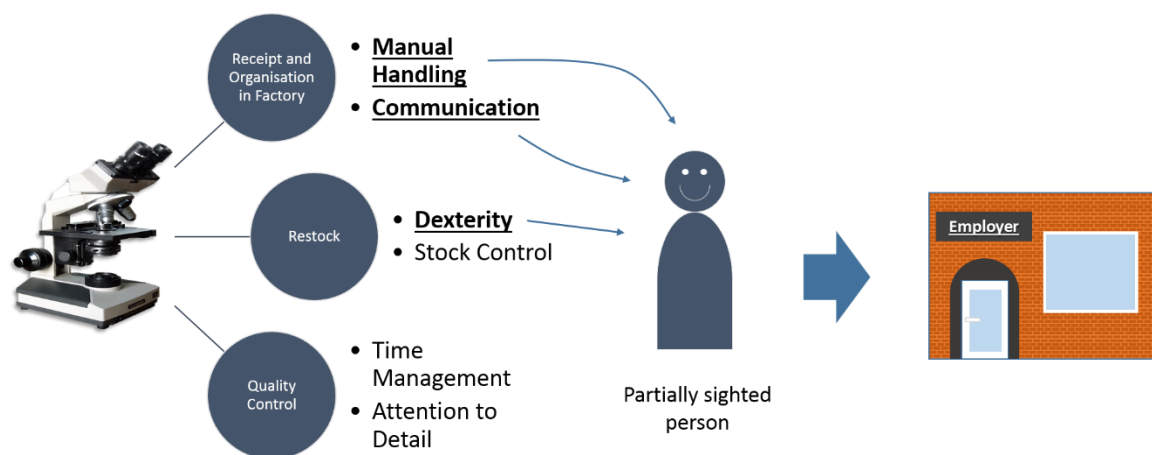


Figure 9. The MAKs require a variety of tasks with differing underlying skills allowing for the assignment of tasks to focus on the development areas of a particular individual. Therefore the individuals are able to develop the skills they require to improve their mainstream employment prospects. The kits enable this to occur even when the disability of the individual might preclude them from performing other tasks.

As well as the training and skills gained by working with the kits, the MAK project has impacted on other training delivery too. The principle behind the pictorial instructions in the activity pack in combination with the picture based guidance for packing provided by other commercial partners has led CPF to introduce diagrammatic instructions for cleaning staff to help identify the correct cleaning products to use in each area. This is particularly useful as there are several staff with difficulties in reading and writing and ensures they still receive a good level of experience applicable to mainstream work.

Overall the kits have a really positive impact on the work performed at CPF and this is compounded by the increased job satisfaction that being part of the MAK project has given many of the employees. Importantly, the training and experience gained are recorded and evidence of development (including that directly related to MAK) is fed back to funding organisations. Moreover, the skills gained processing the kits have been instrumental in enabling some employees on previous six month contracts to both obtain and maintain external mainstream employment.

Future Aspects

Publication and Organisational Effectiveness

Having been using the kits for some time, the impact generated has been hugely beneficial to a wide range of recipients. This should be communicated effectively in order to maximise impact by encouraging others to enjoy the kits by existing or new mechanisms. This is evidenced by interaction through the PSTT, AMBER and Under the Microscope quite well where communication with these organisations has amplified the benefits of the programme in terms of both scale and different administration methods. As well as this, publication should also be used as a tool for having the RMS and other organisations recognised for this work. Publication could provide good evidence to be used in future funding requests as well as for the personal development of those involved. The following should be considered:

- Repository of publications relating to MAKs for future reference
- Actively planning in publication to future events
 - Press releases
 - Website updates
 - Blog entries (Professional)
 - Encouraging school open days while kits are *in situ* (with subsequent school newsletters/website updates/etc)
- Journal style
- Social media interactions

These considerations should enhance rather than impede upon the delivery and use of the kits and care should be taken to avoid raising so much public awareness that demand far exceeds supply of the kits.

"If you don't communicate science, you might as well not have done it."

Randy Olson

The organisation of the MAK project is a considerable feat and has proceeded excellently so far. Direct contact with schools by email and phone seems to be appropriate even if periodically challenging. Information is currently managed by way of a large spreadsheet which doesn't provide the automation capacity or the flexibility that might support expansion or any substantial changes to the project if they were to occur. Feedback has been historically collected by a questionnaire being delivered during personal communication and this has recently changed to an online form. However, these were challenging sources to handle due to size and accessibility. Suggested actions include:

- Consideration of extending capacity if possible to ease waiting times – including the exploration/piloting of 'clusters'
- Automatic follow up communication reminding teachers of the kit arriving, being collected, giving feedback and re-ordering
- Database for collating details from the initial expression of interest all the way through to feedback and re-ordering

Improvements in the Kits

Feedback has been overwhelmingly positive but there are nonetheless several comments regarding the kit and its contents. The overall nature of the kit has been very popular. Changes could, however, be made to the activities and the pack included in the box. The new links to the curriculum are a good start but there is certainly scope (from the users' perspective) for more challenging activities to be included. This should provide a good opportunity to improve cross-curricular application which should increase usage if applied correctly as it could save much lesson planning time. Some small changes could also be made to the information provided within the kit too:

- Clarify the re-ordering process and provide information regarding microscope purchase (including access to funds)
- Encourage the dissemination of the kits to new schools
- Encouragement to publicise the activity in newsletters/website updates and to interact with the RMS in the future

Acknowledgements

This report was produced as part of a 3-month placement at the Royal Microscopical Society and has been supported by the generous input of a number of people. Particular thanks go to:

- Susan Anderson and Kate Wooding from the RMS for hosting the placement and providing significant support throughout.
- Andy and Neal from Oxfordshire Employment, Alanna from the National University of Ireland, Peter Sainsbury and Alison Trew from the PSTT and Miriam Harte from AMBER for all their input.
- All the teachers for their feedback and specifically Lynn Knapp and Sian Davies for their input prior to the release of the main questionnaire.

About the Author

Aaron is a BBSRC funded PhD student at the University of Nottingham. He can normally be found doing fluorescence microscopy based work with the human multidrug transporter ABCG2. He produced the impact report as part of a 3 month placement with the RMS undertaken as his PIPS (Professional Internship for PhD Students) placement.