



Advanced Science Training

A decade of strengthening the research skills of African women through global partnerships

Jodi Lilley and Santie de Villiers

John Innes Centre

The John Innes Centre (JIC) is an independent, international centre of excellence in plant science, research, genetics and microbiology. The JIC's research makes use of a wide range of disciplines in biological and chemical sciences, including microbiology, cell biology, biochemistry, chemistry, genetics, molecular biology, computational and mathematical biology. It receives funding from the UK Biotechnology and Biological Sciences Research Council (BBSRC) for four Institute Strategic Programs (ISPs) that directly address BBSRC strategic objectives in food security, human health and industrial biotechnology.

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AWARD

African Women in Agricultural Research and Development (AWARD) is working toward inclusive, agriculture-driven prosperity for the African continent by strengthening the production and dissemination of more gender-responsive agricultural research and innovation. We invest in African scientists, research institutions, and agribusinesses so that they can deliver agricultural innovations that better respond to the needs and priorities of a diversity of women and men across Africa's agricultural value chains.

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Preface

2018 marks a decade since the inception of the African Women in Agricultural Research and Development (AWARD) Fellowship. In the 10 years since our founding, we have strengthened the science, leadership, and mentoring skills of 1158 scientists from 16 African countries. Impressively, analysis of the data collected over the last 10 years confirms that the AWARD Fellowship has had a tremendous impact in strengthening the pipeline of African women available to lead agricultural research.

Before they can be effective agricultural research leaders, African women must first be scientists of uncompromising quality. As such, strengthening the scientific research skills of the fellows is a critical component of the AWARD Fellowship. Advanced Science Training (AST) is a key component of our efforts to strengthen African women's scientific research skills; AWARD Fellows are selected to participate in research placements with partner institutions around the world. AST placements are only open to the very best of our Post Masters' and Post-Doctoral AWARD Fellows.

We are thankful that, since 2009, 44 of the world's leading research institutions from 25 countries have sought to partner with AWARD to host research placements for our fellows. These top research institutions host AWARD Fellows for research placements because, like us, they are committed to bridging the gender gap in agricultural research by strengthening the pipeline of women entering leadership positions across the sector.

This report is the first systematic analysis of the impact of AWARD's AST. The report is an account of not just AWARD's and our partners' contributions, but most importantly, of the 182 AWARD Fellows who have taken advantage of their AST research placement opportunities. These women scientists have used their placements at some of the world's best laboratories to gain access to cutting-edge technologies, learn new skills, and enhance their ability to solve pressing needs of farmers in their home countries.

An impressive 94% of the AWARD Fellows reported a significant improvement in their technical skills and there is compelling evidence that the AST experience is a catalyst for AWARD Fellows to accelerate their research.

Collaborations are critical to research and innovation. We are encouraged that, as a result of their AST research placements, a remarkable 71% of the fellows have forged new research partnerships between their

home institutions and their host institutions. These innovative new partnerships range from joint studies and publications to staff exchange programs.

The study also contains important lessons that would be valuable to anyone trying to replicate the AWARD Fellowship model. It highlights the importance of nurturing connections not just between individual scientists, in this case AWARD Fellows and their AST supervisors, but also catalyzing connections between their two research institutions. We have also learned that AST research placements begin long before the AWARD Fellow arrives at her host institution and that laying a strong foundation can lead to years of productive research collaborations long after a research placement.

My heartfelt appreciation goes to the past and present members of the AWARD staff team and the Steering Committee who have been critical to the success of the fellowship. I also offer my deepest gratitude to Jodi Lilley of John Innes Centre and Santie de Villiers of Pwani University for leading this important study.

My team and I welcome you to read, engage and share this report as together we work towards inclusive, agriculture-driven prosperity for the African continent.

With many thanks for your support,



Wanjiru Kamau-Rutenberg PhD
Director, AWARD

The second United Nations sustainable development goal of “zero hunger” could not be clearer or more challenging. In Africa, where changes in demography and climate will impose additional hurdles, meeting this goal will require significant increases in agricultural productivity. As the green revolution has shown us, one of the strongest drivers of agricultural productivity is research and development.

The work of AWARD in strengthening the capacity of African scientists to drive agricultural productivity is exceptional. The data presented in this report demonstrate transformational change in the female scientists who participated in AWARD’s advanced science training (AST) program. 95% of participants reported real change in their scientific abilities and 95% of participants have remained in Africa – these data combined augur well for the long-term impact of the program.

The John Innes Centre was honoured to be chosen as an AWARD host institute for AST placements and delighted with the outcome of those placements. We are proud supporters of this report and committed partners in AWARD’s ambitious plans for the future.

I would like to take this opportunity to thank the report’s authors for their work during this project, the UK Biotechnology and Biological Sciences Research Council for funding Jodi Lilley’s participation and all at AWARD for their endless warmth, professionalism and dedication.



Christopher Darby
Head of Policy and International, JIC



Acknowledgements

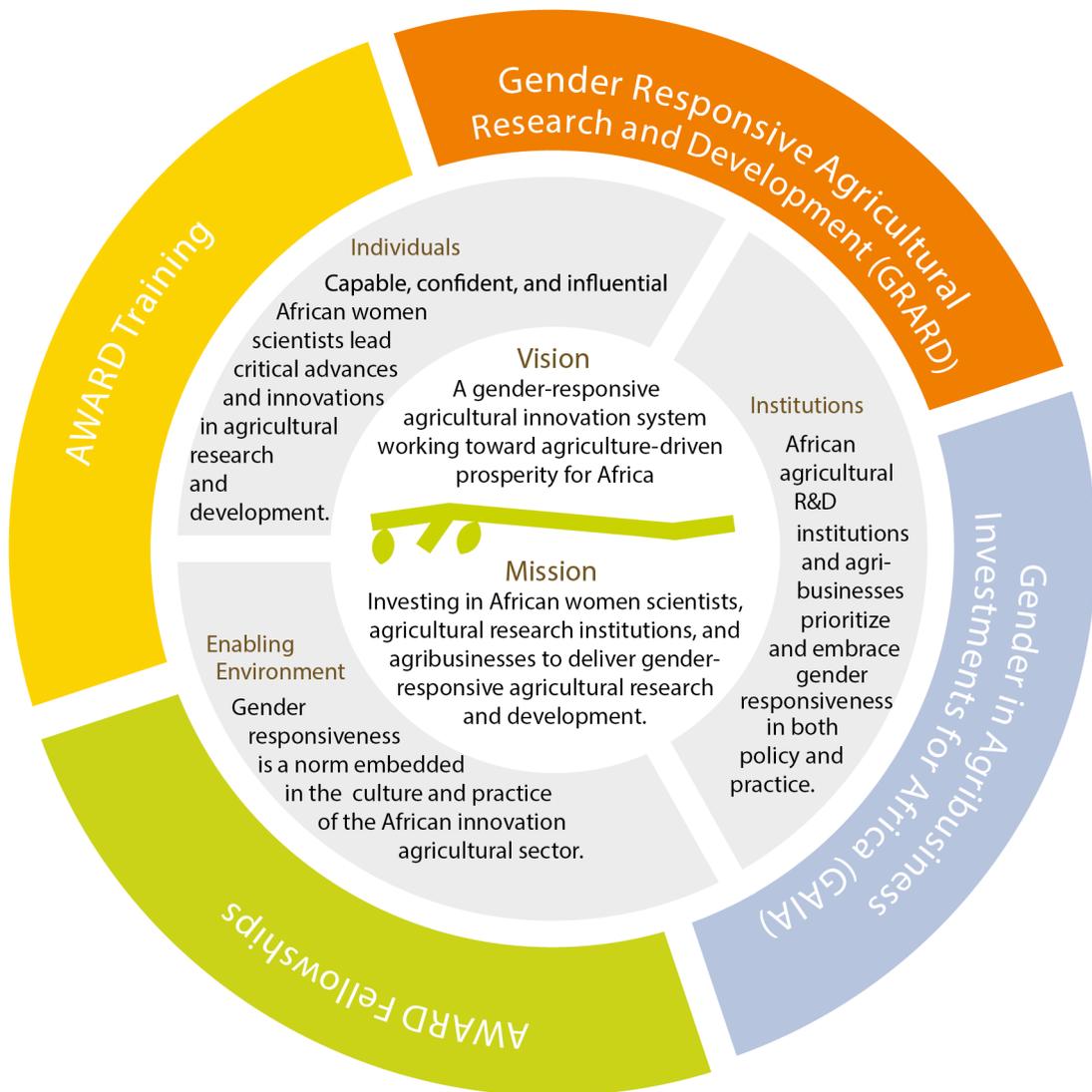
The authors thank the Bill & Melinda Gates Foundation, USAID, and Agropolis Fondation for supporting the AWARD Fellowship. We also thank the BBSRC for providing funding to the JIC through the Global Challenges Research Fund Impact Acceleration Account which supported Jodi Lilley's attachment to AWARD in 2017 and contributed to the development of this impact study. The JIC extends its thanks to all AWARD staff members and AST coordinators for their enthusiastic support and welcoming spirit.

Contents

about AWARD	1
The AWARD Fellowship model	3
Advanced science training (AST)	4
The AST impact study	5
The fellows	7
Expectations and preparation	8
Negotiation and agreement	9
Impact for fellows	11
Technical skills	12
Partnerships	16
Personal development	22
Career acceleration	28
Impact at home	31
Individual level	32
Organizational level	38
Societal level	42
Opportunities	48
Aspirations and future challenges	50
The role of AWARD – emerging lessons	52
Concluding remarks and way forward	54
References	54
Recommendations	56
Recommendations for AWARD: An AST impact road map	57
Recommendations for AST hosts for research attachments	59
Recommendations for fellows participating in AST	60
Appendices	62
Appendix A: List of host institutions	63
Appendix B: Questionnaire and interview questions	64
Appendix C: AWARD's purpose road map	69
Appendix D: Selected publications by fellows post-AST	71
Appendix E: Selected accounts of fellows from the survey	79
Appendix F: Inspiration and advice from fellows	84

about AWARD

African Women in Agricultural Research and Development (AWARD) works toward inclusive, agriculture-driven prosperity for the African continent by strengthening the production and dissemination of more gender-responsive agricultural research and innovation. We aim to catalyze transformative change in scientists and agricultural research and development institutions by enabling these different level actors to conduct and promote agricultural research and innovations that better respond to the needs and priorities of a diversity of women and men across Africa’s agricultural value chains.





Our vision

AWARD envisions a robust, resilient, and gender-responsive agricultural innovation system working to drive prosperity and food and nutrition security for Africa.

Our mission

Contributing toward this vision, AWARD is investing in African scientists, research institutions, and agribusinesses to deliver innovative, sustainable, gender-responsive agricultural research and innovation.

Guiding the execution of our mission are three pillars:

Pillar 1:

We seek to have capable, confident, and influential women scientists lead critical advances and innovations in the African agricultural research and development sector. We will continue investing in high-achieving women scientists and building the continent's pool of talented innovators.

Pillar 2:

We will support African agricultural research and development institutions to prioritize and embrace gender responsiveness in both policy and practice. We will work with selected partner institutions to grow their capacity for gender-responsive agricultural research by leveraging the talents of gender-diverse research teams, and by strengthening gender prioritization in research, design, implementation, and dissemination.

Pillar 3:

We will work to ensure that gender responsiveness becomes an embedded cultural norm and practice in the African agricultural research and development sector and beyond; by strengthening the ability of research institutions and individual scientists to conduct more inclusive, better targeted, and better designed agricultural research in Africa. We focus on increasing the visibility of individual scientists and leaders, generating and curating compelling evidence on the value of gender responsiveness in agricultural research and development institutions. We will also work to transform the growing awareness of gender and related issues into policies, programs, and accountability mechanisms.

The AWARD Fellowship model

Through the AWARD Fellowship, AWARD has since 2008, worked to cultivate a growing pool of women to be (a) effective within agricultural research and development institutions supporting the agricultural value chain; (b) effective across a range of research disciplines serving the sector; (c) responsive to gender issues in the service of women, without excluding men; and (d) technically competent to generate innovations needed by rural smallholders, most of whom are women. Between 2008 and 2014, 4,261 African women scientists, from about 450 institutions in 16 eligible countries*, applied for 465 available fellowships.

Each AWARD Fellow benefits from a unique 2-year career development program focused on fostering mentoring partnerships, building science skills, and developing leadership capacity. The uniqueness of AWARD's holistic career-development program results in sharpened skills in science, research, and writing, as well as mentoring, team management, and leadership, all conducted with a focus on gender issues.

Fostering mentoring partnerships

Mentoring is a proven and powerful driver for career development and particularly for retaining women in science. AWARD pairs each fellow with a mentor—a senior professional, carefully chosen to match the fellow's area of expertise and career goals. Each AWARD Fellow is mentored for one year as part of the fellowship package. Mentors volunteer their time to AWARD and we deeply appreciate them. Mentors are identified either from the AWARD database (created through a rigorous continuous process that involves identifying and contacting potential candidates) or through the fellow's nomination.

Developing leadership capacity

The AWARD Fellowship is explicitly designed to help women in agricultural science increase their visibility and to empower them to serve as effective leaders within their research teams, institutions as well as their communities. Through AWARD's leadership training courses, fellows learn to navigate organizational gender issues, leverage team talents, manage conflicts, and use influence appropriately.

Building science skills

One of the keys to improved agriculture-dependent livelihoods involves building and sustaining a strong, effective talent pool in agricultural research and development. AWARD expands the fellows' world of science, facilitating their access to the latest methodologies and technologies while building their professional networks. In turn, it brings the groundbreaking work of women in agricultural science to the national, regional, and global levels, where it is much needed.

AWARD offers a portfolio of tailored training courses and services including:

1. AWARD Science Skills Course - fellows to choose either:
Scientific Writing and Publishing Skills or Research Proposal Writing Skills)
2. Competition for Advanced Science Training (post-masters and post-doctoral fellows only)

*Burkina Faso, Cameroon, Cote d'Ivoire, Ethiopia, Ghana, Kenya, Liberia, Malawi, Mali, Mozambique, Nigeria, Rwanda, Senegal, Tanzania, Uganda, and Zambia.

Advanced science training (AST)

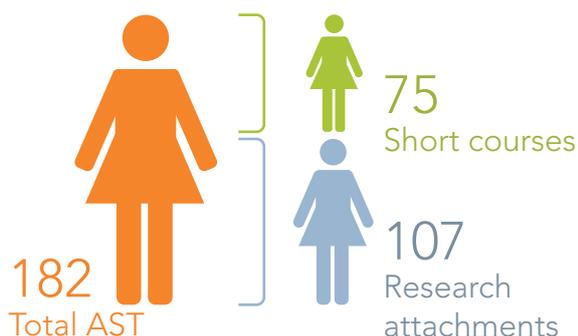
For nearly 10 years, AWARD has helped fellows strengthen and expand their areas of expertise through AST. AST is a competitive program within the AWARD Fellowship offered to post-master's and post-doctoral fellows for either 3- to 9-month attachments or short course training at state-of-the-art host institutions. The program assumes knowledge, skills and experiences gained during AST will increase the influence AWARD Fellows have in developing and implementing technological innovations in their institutions and for the agricultural research and development sector as a whole.

The AST program aims to specifically help fellows:

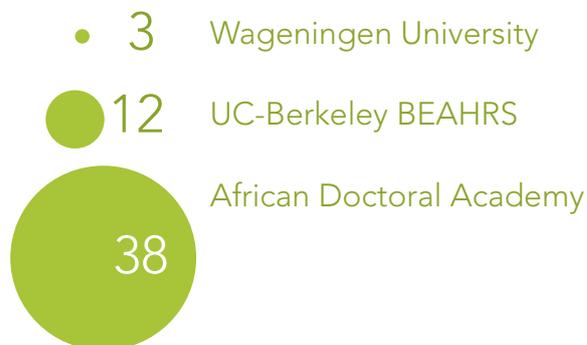
- improve their science/professional skills,
- increase their professional networks,
- increase their visibility,
- increase their confidence to present their (research) results
- improve their chances to publish in refereed journals
- identify and pursue collaboration and partnership opportunities for themselves as well as their home institution

From 2009 to 2017, 182 AWARD Fellows have participated in the AST program, 107 on research attachment and 75 for short courses. Training has taken place at 44 host institutions in 25 countries. AST hosts are internationally recognized centers of excellence in agriculture including research institutions, organizations, private companies and universities world-wide (see complete list in Appendix A).

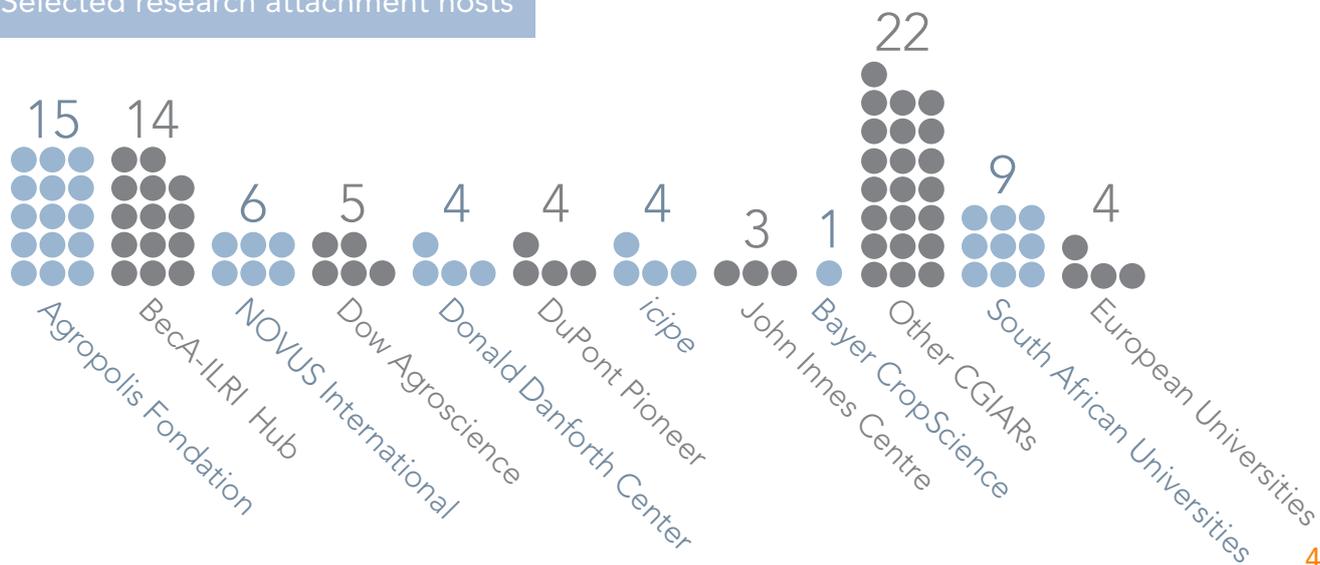
AST participants 2008 - 2017



Selected short course providers



Selected research attachment hosts



The AST impact study

The high number of AST placements (182) and longevity of the program (8 years) provide a unique opportunity to investigate what long-lasting change has resulted. In March 2017, AWARD and the UK's first AST host institution, John Innes Centre, initiated a collaborative study to explore these impacts and understand how they have manifested. Particularly, the study set out to explore specific areas including:

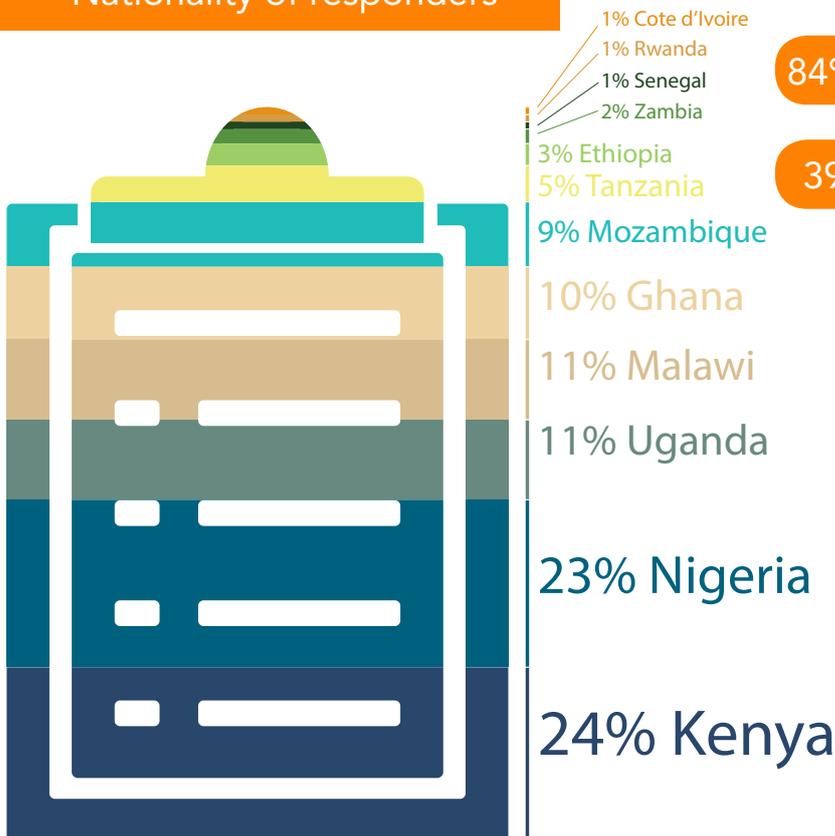
- Technical skills
- Partnership
- Personal development
- Career acceleration
- Impact at home

The study included an online questionnaire open for approximately 1 month to all 147 AST participants who had completed the program at the study's start (85 research attachment and 62 short course attendees). The questionnaire response rate was 84% (123 responses) with 81% and 87% for research attachment and short course respectively.

Additionally, 39 fellows from the 5 countries with the largest number of fellows were interviewed in person (Ghana, Kenya, Malawi, and Uganda) or by Skype (Nigeria). Interviews were on a volunteer basis and approximately 45 minutes long. All were semi-structured and conducted by a single individual for consistency. The questions were based on a standard set that was informed by previous studies (Appendix B)¹. Only five interviewees did not also participate in the online survey.

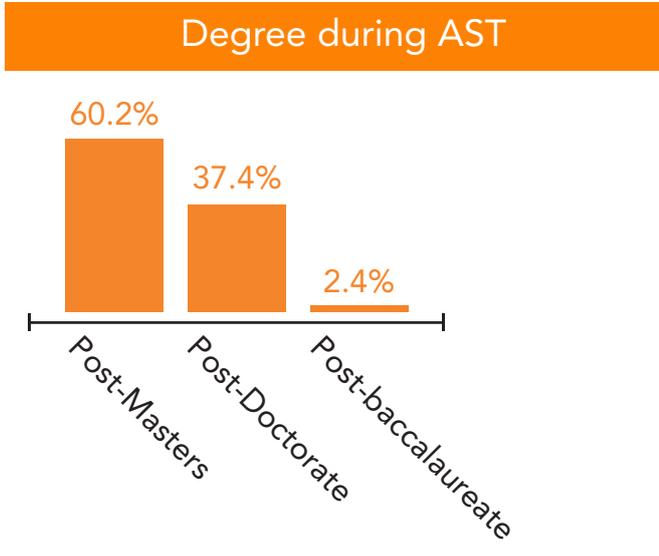
The data presented is self-reported by fellows. However, a list of publications authored by fellows post-AST is presented in Appendix D. Quotes in this document are drawn from both the questionnaire and interviews. They are left anonymous to protect the fellows. Excerpts were sometimes pulled from larger quotes and spelling or grammar mistakes were corrected for readability. Every effort was made to retain the 'voice' of the fellow and their intended meaning. Accounts presented at the beginning of the impact sections were selected from the questionnaire. Additional accounts can be found in Appendix E.

Nationality of responders



84% responded to questionnaire

39 interviewed from 5 countries

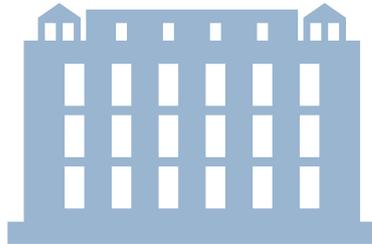


Fellow's home institution type

44% Universities



41% Research Institutes



7.5% Government



4.5% Non-Profit

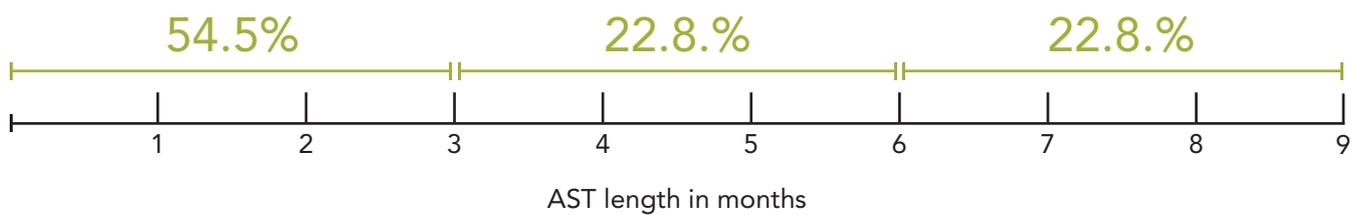


1.5% Commercial

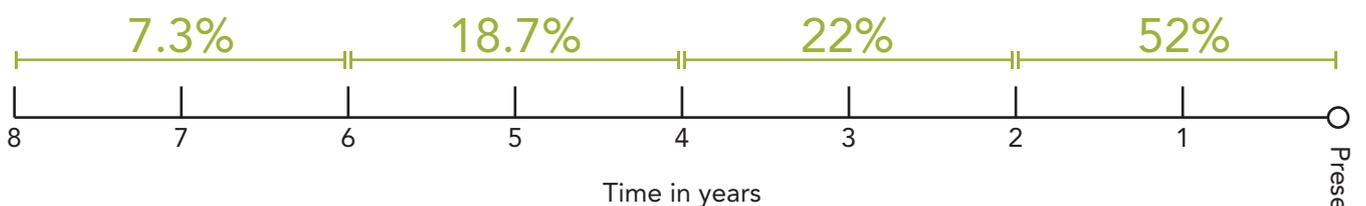


1.5% Other

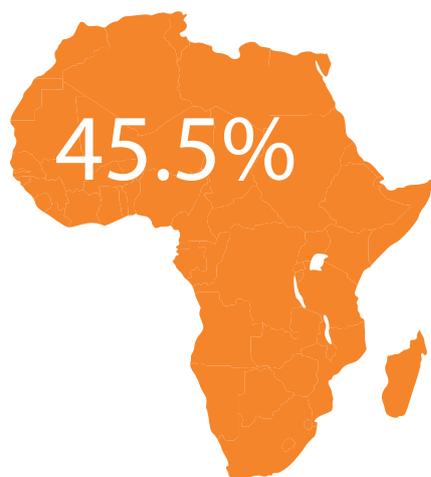
AST duration



Time since AST

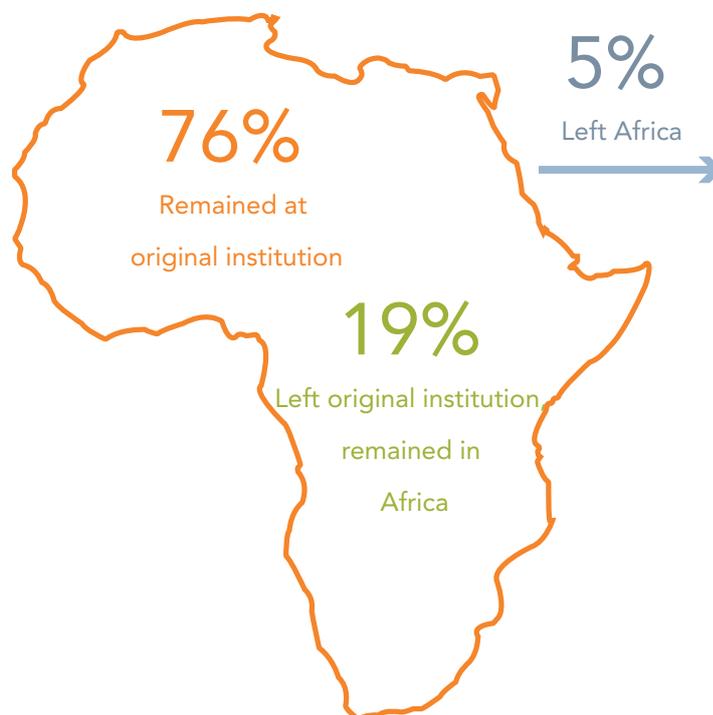


AST location



54.5%
(Outside Africa)

Movement since AST



The fellows

The participating AST fellows work in a wide range of agriculture development fields from agronomy, biotechnology, breeding, chemistry and engineering to advocacy, economics, extension and gender studies. These include but are not limited to:

- Bioenergy
- Food chemistry
- Livestock reproduction
- Plant and livestock diseases
- Vegetable and mushroom cultivation
- Nutrition
- Climate change
- Food safety
- Molecular breeding
- Soil Science
- Conservation and remediation

The questionnaire respondents indicate their home institutions are predominantly universities (44%) or research institutes (41%). The remaining respondents designate their home institutions as government (7.5%), non-profit (4.5%),

commercial (1.5%), or other (1.5%). The majority have remained at this home institution since their AST (76%). Of those who have moved to other institutions, 11% are at institutions in the same country, 4.1% in the same region, 4.1% in another African country, and 4.9% are outside of Africa.

The majority of respondents had their ASTs up to 2 years ago (52%). The rest happened up to 4 (22%), 6 (18.7%), or 8 (7.3%) years ago. It should be noted that AST cohorts were bigger in more recent years. Thus, the lower percentage for early ASTs in responding fellows does not necessarily reflect a lack of responsiveness in these groups. At the time of their AST, more respondents were at the post-master's level (60.2%) than at the post-doctoral level (37.4%). A small percentage (2.4%) were post-baccalaureate. The duration of half ASTs were between 0 to 3 months (54.5%), while longer durations of 3 to 6 months (22.8%) and 6 to 9 months (22.8%) were also reported. The host institutions were located both within Africa (45.5%) and outside of Africa (54.5%).

Expectations and preparation

Fellows had a range of expectations and objectives for their AST experiences. Many were seeking a specific skill that was holding them back from making progress in their research such as molecular biology or qualitative data analysis. Often the equipment and expertise for these skills were lacking at their home institution. They also wanted exposure and practical experience with cutting-edge technologies, field-specific best practices, and up to date knowledge. For some, this would strengthen existing skills and for others it would add a new dimension to their work. Many also wanted access to improved 'soft-skills' such as leadership, supervision and interpersonal communication. The AST also offered an opportunity for fellows to expand their networks and form new collaborations.

These objectives were important for the fellows at the time of their AST for various reasons. Some were in pursuit of further qualifications such as a PhD. Some were held back from promotions due to their inadequate publication record. Some needed international visibility to compete for grants. The AST was an opportunity to focus on skills required to collect or analyze existing data and publish in journals of higher prestige. Some had also been placed in new roles after receiving their AWARD Fellowship and needed to upgrade their expertise for teaching and management of others.

'The AST changed my life. I don't know where I would be without the AST. Probably I would just be going round, round, round doing projects without outputs.'

In preparation for the AST, multiple strategies were used by fellows. For most, there was a process of reflection to define AST objectives. This was facilitated by the application process and purpose road map development (Appendix C). Once notified they had won the training opportunity, fellows applied for leave from their home institutions and justified their absence. While in many cases, home institutions were supportive, lengthy negotiations were necessary

for some fellows involving AWARD moderators. Some fellows found the process smooth when their institutions had prior positive experiences with AWARD. Some fellows who faced skepticism by their immediate supervisors found the negotiations benefited from engaging those higher up in the organization. Arrangements also had to be made for responsibilities in their personal life. Multiple fellows with young families benefited from the ability to travel with their children or flexibly amend their attachments due to unexpected circumstances at home.

Once matched with a short course or research attachment, the fellows began to investigate aspects of life where they would visit, including weather and cultural norms. Many fellows did background reading and/or watched videos on the internet concerning particular procedures. For research attachments, work plans were prepared with objectives through a back and forth exchange between fellows and their host supervisors. Some even prepared samples ahead of time and had them shipped in advance or, where permitted, carried them as they traveled to the host destination. In some cases, fellows developed implementation plans for how they would use their training when they returned home.

Negotiation and agreement

Negotiation was important at every phase of the AST experience. The fellows negotiated with their home institution for permission to participate in AST. For those on research attachment, they negotiated with their hosting supervisor around objectives and work plans. They sometimes negotiated with AWARD on logistical details and changes to their plans. Negotiations arose often during the AST experience to a greater or lesser extent and how fellows resolved them was critically important. When the fellow was able to draw upon her AWARD leadership training and mentoring experiences to navigate the negotiations to a positive end, the result was a huge boost of confidence and self-belief. They saw themselves be assertive in often intimidating situations with 'big-name' colleagues or hosts. This raised the discourse of the interaction between the parties to one of equals, feeding a growing sense of empowerment in the fellow.

'Nurture a partnership by first establishing what each partner brings to the table and what the shared vision is for the project. Establish a system where each partner can contribute to the other's expertise space in the common agenda. This should be done through mutual respect and understanding and by establishing a partnership of equality and not hierarchy.'

When a fellow was not able to resolve a dispute or mismatch of expectations during AST they could become overwhelmed by frustration. At these times support from others was really important. For those a long way from home in another cultural setting, the frustration could be made worse by feelings of isolation. Many times these ASTs did not have the productive output the fellow desired. However, even in such situations the personal development gains of having withstood and moved past a challenging experience ultimately also built confidence.

'That challenge and the way I overcame it made me know that I am strong. I had never known that I am that strong. Now I know I am someone who cannot lose hope; no matter the challenges I remain focused.'

For many, the negotiation muscles developed during AST were put to the test when they returned to their home institution. Fellows can return to high workloads and resentment from colleagues and supervisors for time away. The negotiations taking place at this stage had dramatic consequences for how well the fellow could use their new skills and knowledge to build capacity at home.



Overview

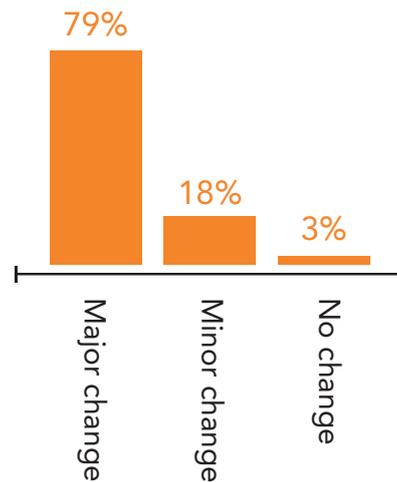
Impact for fellows

A separate study analyzing feedback upon AST completion collected between 2008 and 2011 indicated the fellows were placed in supportive and excellent host institutions in the majority of cases. The fellows were often receiving good training and development outcomes. As a snapshot, the following indicates the percentage of AST participating fellows who rated the indicated area as 'satisfactory' or 'very satisfactory':

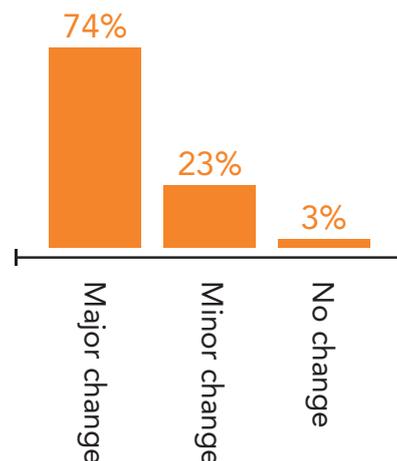
- Host institution facilities – 89%
- Logistical support from host – 79%
- Access to host supervisor – 84%
- Access to host support – 79%
- Access to host facilities – 84%
- Access to host internet – 79%

This study focused on the lasting change fellows attributed to their AST experience. The majority of respondents indicated their AST resulted in major changes to their scientific skills, knowledge, and experimental approaches (73.7% Major Change, 21.8% Minor Change, 4.5% No Change). The skills acquired and relationships developed during AST had an impact on the networking, visibility and access to scientific resources for the majority or responding fellows (Major change: 79.7%, minor change: 16.5%, no change: 3.8%). The areas of individual development explored in this study were technical skills, partnerships, personal development, and career acceleration.

Change in networking, visibility and access to scientific resources



Change in science skills, knowledge and approaches



Categories explored

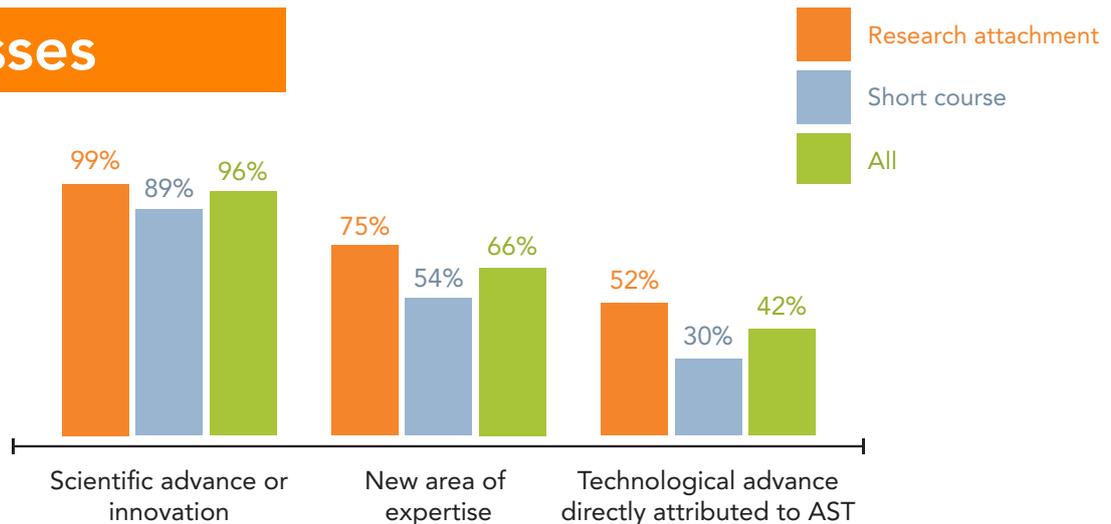
- Technical skills
- Partnership
- Personal development
- Career acceleration

Impact for fellows:
Technical skills



Impact for fellows: Technical skills

Successes



Example of skills learned

Molecular biology techniques

Statistical analysis for quantitative and qualitative data

Gender mainstreaming

Bioinformatics

Phylogenetics

Microbial isolation and identification

Analytical chemistry

Examples of translational technologies pursued

- Disease resistance in maize, wheat, sugarcane, beans and cassava
- Abiotic stress resistance in barley
- Affordable rotational dryer to improve fresh vegetable processing on small scale farms
- Tissue culture business development

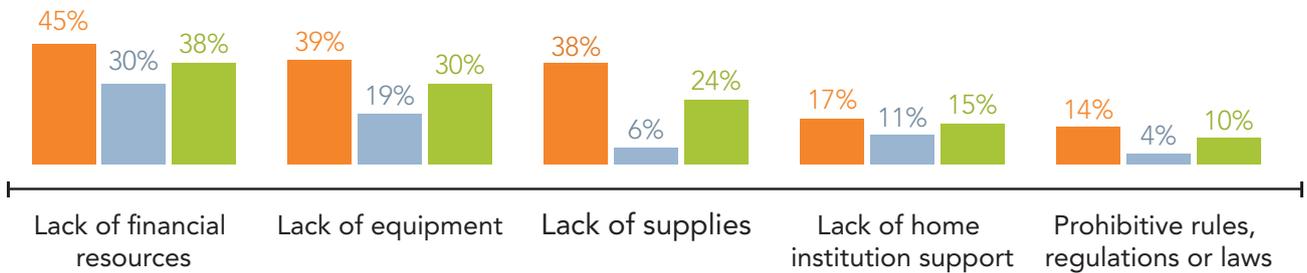
Accounts of success

'It is the Women's Empowerment in Agriculture Index I learned during my AST that I am now using in my PhD to measure empowerment, agency and inclusion of women in Nigeria's Southwest agricultural region.'

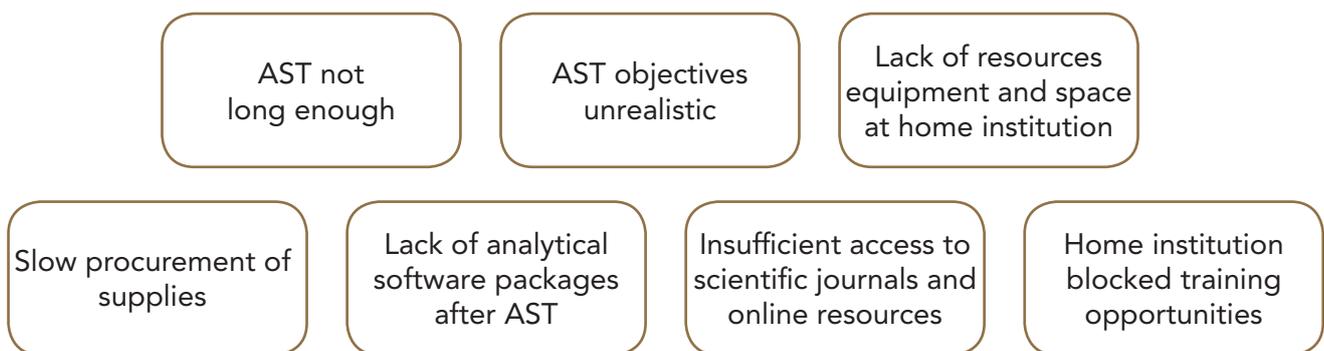
'I acquired skills related to transient expression of recombinant proteins and purification of the expressed proteins. The proteins will be used for the production of antibodies needed for diagnostics. Given the rapid rate of mutation and emergence of plant virus diseases in Africa, this technology needs to be transferred to Africa immediately.'

'My understanding of genomics, genome editing and bioinformatics has been greatly enhanced and as a result, my confidence in this area of expertise is greatly boosted giving me the impetus to boldly share my work and contribute in this area.'

Challenges



Examples of challenges



Accounts of challenges

'I am spread thinly across various research themes and I have also taken up a number of managerial tasks that have prevented me from focusing and diving deeply into gender research and training.'

'We lack the financial resources for equipment and supplies for practicing the molecular techniques I acquired during the training.'

'I think that AST is good but if one is not supported by management, then the skills and knowledge obtained cannot be really put to use.'

Impact for fellows

Technical skills

For the most part the fellows picked up the technical skills they set out to gain. A scientific advance or innovation success was reported for almost all the fellows surveyed (94%). The access to cutting-edge techniques and supplies or sophisticated software often accelerated their research. For some (66%), the experience developed an entirely new area of expertise. For research attachments, a work plan established well in advance and clear objectives often facilitated progress. Slow progress could result from a lack of preparation on the part of the fellow or their host supervisors. Progress was facilitated in some cases when a 'point-person' was appointed by the host institution to train and support the fellow. Exposure to lab organizations, rules and regulations 'opened their eyes' to new ways of doing science. For those on short courses, many gained skills they were able to utilize right away and accelerate their research projects. Many interviewees reported the more immediate the need for the skill, the more motivated and determined the fellow was in the course and the more they got out of it as a result. The courses for the most part were fast paced and challenging. The teaching material provided allowed them to learn on their own outside of class.

'The AST gives people the chance to gain more skills which without the AST they wouldn't have gotten.'

'One must assess their needs and make sure the course is filling an immediate need. Otherwise you might regret your choice and not be focused.'

In some cases scientific advances came out of AST research directly. For example, one fellow discovered two novel fungicidal compounds from plant material brought with her from her home

country. Another was able to develop a protocol for quantifying carotenoids in sweet potato in her home country. Particularly sought out skills were those in molecular biology and bioinformatics. One fellow used updated molecular techniques to produce proteins necessary for developing a diagnostic kit for a cassava disease. Nearly half (42%) of responding fellows attribute a technological advance directly to their AST.

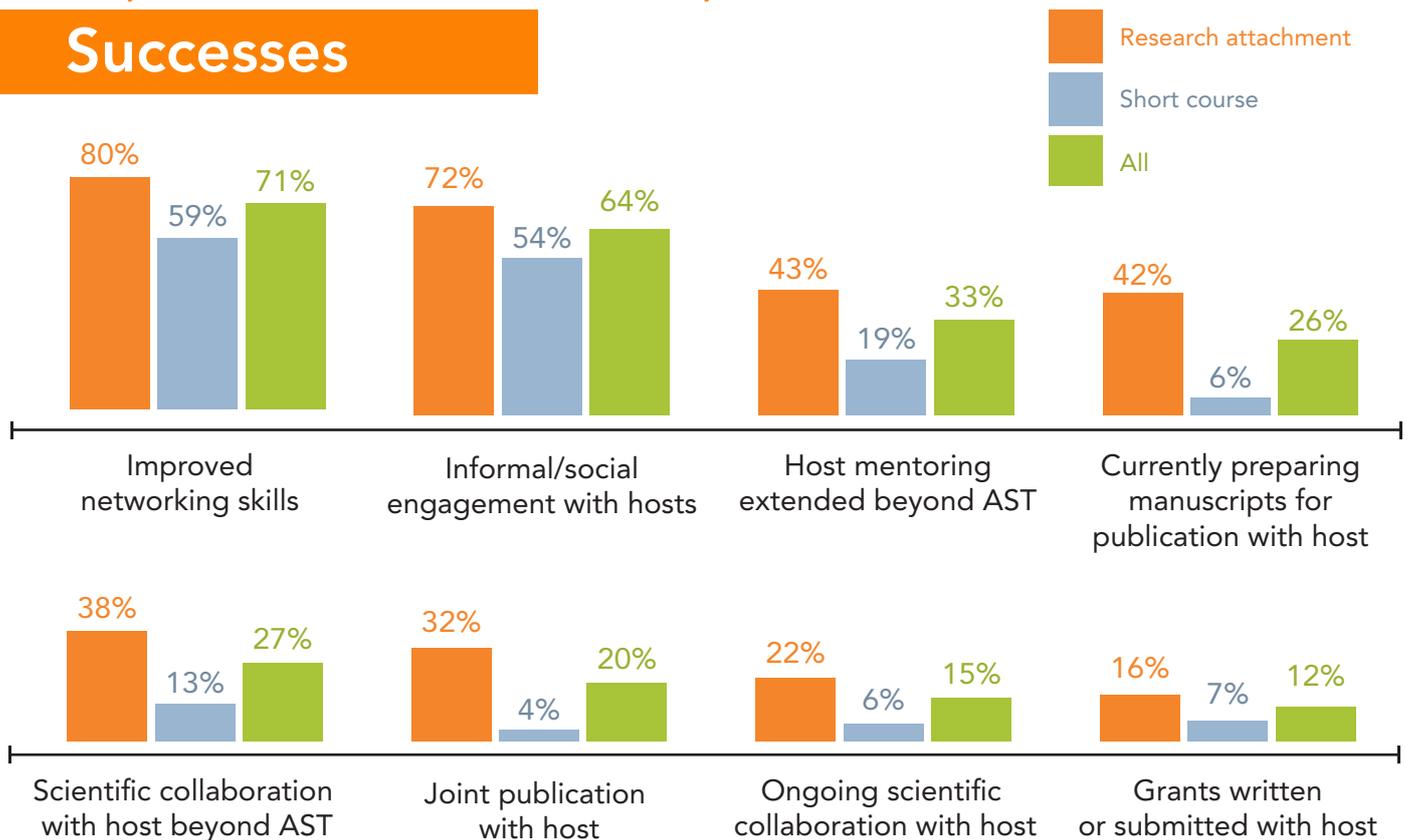
There were scientific challenges as well. Fellows reported a lack of financial resources (38%), equipment (30%), supplies (24%), or prohibitive rules, regulations or laws (10%) at the host institution during AST or at home when they returned. Fewer than 5 were unable to procure the materials they needed to make progress towards objectives. In a few instances (fewer than 5), money for a research attachment was slow in arriving leading to delays in the purchase of consumables. Some were also unable to get their biological samples from home in time to complete their experiments. A small number of fellows (15%) reported that a lack of support from their home institution hampered their progress towards AST objectives. Several interviewees described how their initial scientific objectives were too ambitious for the time they had with their hosts. On occasion, the short courses undertaken fell below the fellow's expectations. A small number of fellows reported inefficient use of time by course instructor (fewer than 5).

Impact for fellows:
Partnerships

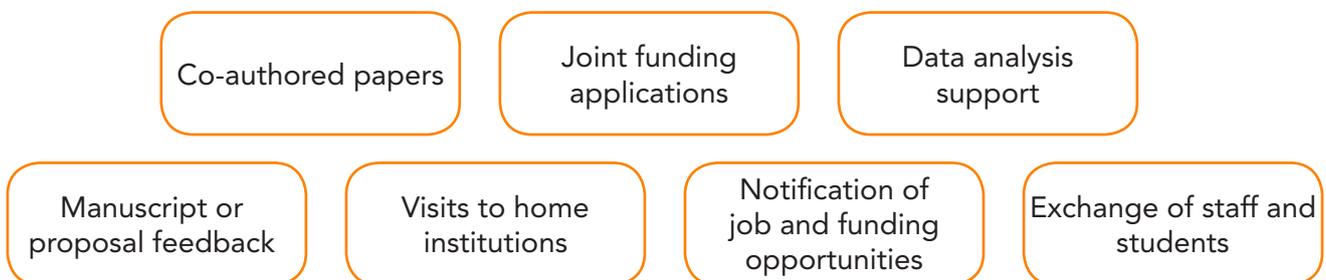


Impact for fellows: Partnership

Successes



Examples of success



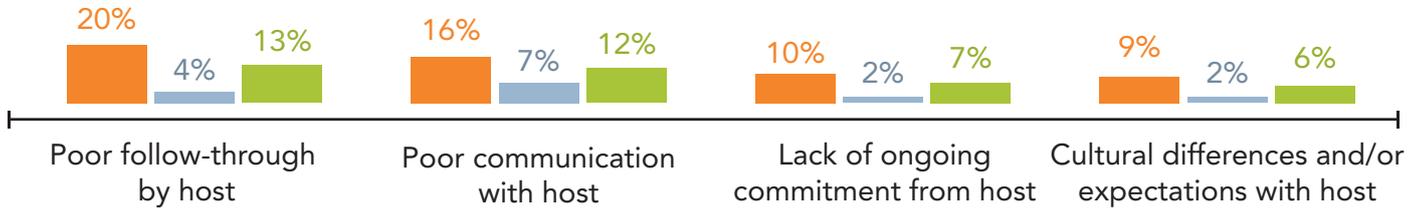
Accounts of success

'I have won 3 research grants with my AST supervisor. I have published 1 manuscript with my AST supervisor, another is in press and 4 more are in draft form. I organized the 1st African Mycotoxin Symposium with my supervisor and we are organizing the 2nd next year.'

'I have jointly published 5 refereed journal papers with my host, 1 journal paper is under review, 1 technical magazine article has been published, and I prepared about 4 presentation which I made in international meetings. I wrote a grant proposal which was funded 2013-2015 and another 2016-2018. We are co-supervising students together.'

'I was asked to give a presentation to course participants from Michigan State University. Later while interacting with them I met a scientist from China who is interested in developing a proposal with me on sorghum bio-fortification to be presented to the Chinese Academy of Sciences.'

Challenges



Examples of challenges

Conflict over mismatch in expectations

Disagreement over objectives

Language barriers

Racial bias against fellow

Accounts of challenges

'The host institution had promised that they would keep in touch after the AST. However, I wrote several times thereafter to the lead trainer who offered the short course, but I never got a response. Unfortunately, I gave up.'

'This is the most painful part of the AST for me. I could not complete the proposed work during the AST, mainly because of factors beyond my control. And so at the time of leaving, I had an agreement with my major host to put someone on the remaining aspect of the work, since I had acquired the skill and all I needed was extra time. Well, this arrangement did not work out.'

'I think the greatest draw back was the fact that my supervisor, who would go to extreme depth to have me learn as much as possible, retired soon after my attachment! So the next time I sought him for collaboration, I learnt he was no longer working at [the host], there was nothing he could do. I felt a bit stranded at the point and dropped the idea.'

Impact for fellows

Partnerships

Another objective for the AST program is to expand the networks and collaborations for the fellows and their home institutions. The majority of fellows report an improvement in networking skills (71%) and a variety of partnership successes. Many relationships were formed during AST and 64% of fellows report attending social or informal engagements with colleagues they met at their hosting institution. Some have had colleagues from their host institution visit them in their home countries. Mentoring relationships have been maintained for 33% of fellows. AST mentors continue to contribute to the development of fellows in several ways including providing feedback on manuscripts and grant proposals and information about job opportunities or funding for degree programs. Students have also moved in both directions between fellows and their AST host colleagues and supervisors. Short course instructors have provided feedback and support beyond the AST and course mates have submitted grants and publications together.

'I just need to focus on this one thing that I am doing and do it really well. All I need to do is have strategic collaborations around me. Surround myself with the right people.'

There were interpersonal challenges that fellows faced during their AST. A small number (6%) reported cultural differences and/or expectations between themselves and their hosts. While some fellows experienced a sense they did not belong or were not welcome at their host institution, one reported they were discriminated against through racial bias. Some AST experiences (12%) suffered from poor communication between the fellows and hosts. Fellows who were placed in institutions where the preferred language was not one they knew felt poor communication hampered their progress.

Additionally, when scientific priorities of hosts and fellows diverged, conflict could arise. Often in these cases a work plan and objectives were not completely agreed upon in preparation for the attachment. While these partnership challenges were experienced by a very small number of AST fellows (fewer than 5), they could have dramatic effects on the quality of these experiences. These lessons arose in early AST placements and AWARD subsequently made every effort to prevent them from happening again.

In some cases, more than one fellow would attend the same short course or be placed at the same research institution. For the most part these experiences were positive. Friendships were formed and the women were able to support each other when challenging situations arose. However, there were cases where the fellows did not have productive relationships with each other. In one case, two fellows worked on the same project during their AST. The situation suffered from both an interpersonal clash between the fellows and an unclear demarcation of the responsibilities for each fellow. This AST experience did not produce the research outcomes the interviewed fellow aimed to achieve. For the most part however, such 'team' or 'partnership' experiences provided additional benefits to fellows away from home.

'My AST involved working with a fellow with whom I found myself in conflict most of the time. However, I was able to use emotional intelligence to manage the conflict and to move ahead with the project until we finally produced the final project report. Subsequently, I am able to deal with conflicts much more easily.'

For some, high level working partnerships have developed out of AST relationships. Scientific collaboration extended beyond the AST for 27% of fellows and 15% have collaboration of some kind currently with AST hosts. One fellow reported receiving ongoing data analysis support many years after her AST. A quarter of fellows (26%) are currently preparing manuscripts for publication with their hosts and 20% have had at least one joint publication already. Some fellows on research attachment have been disappointed by their host partners, reporting a lack of ongoing commitment (7%) or poor follow-through on agreements made during the AST (13%).

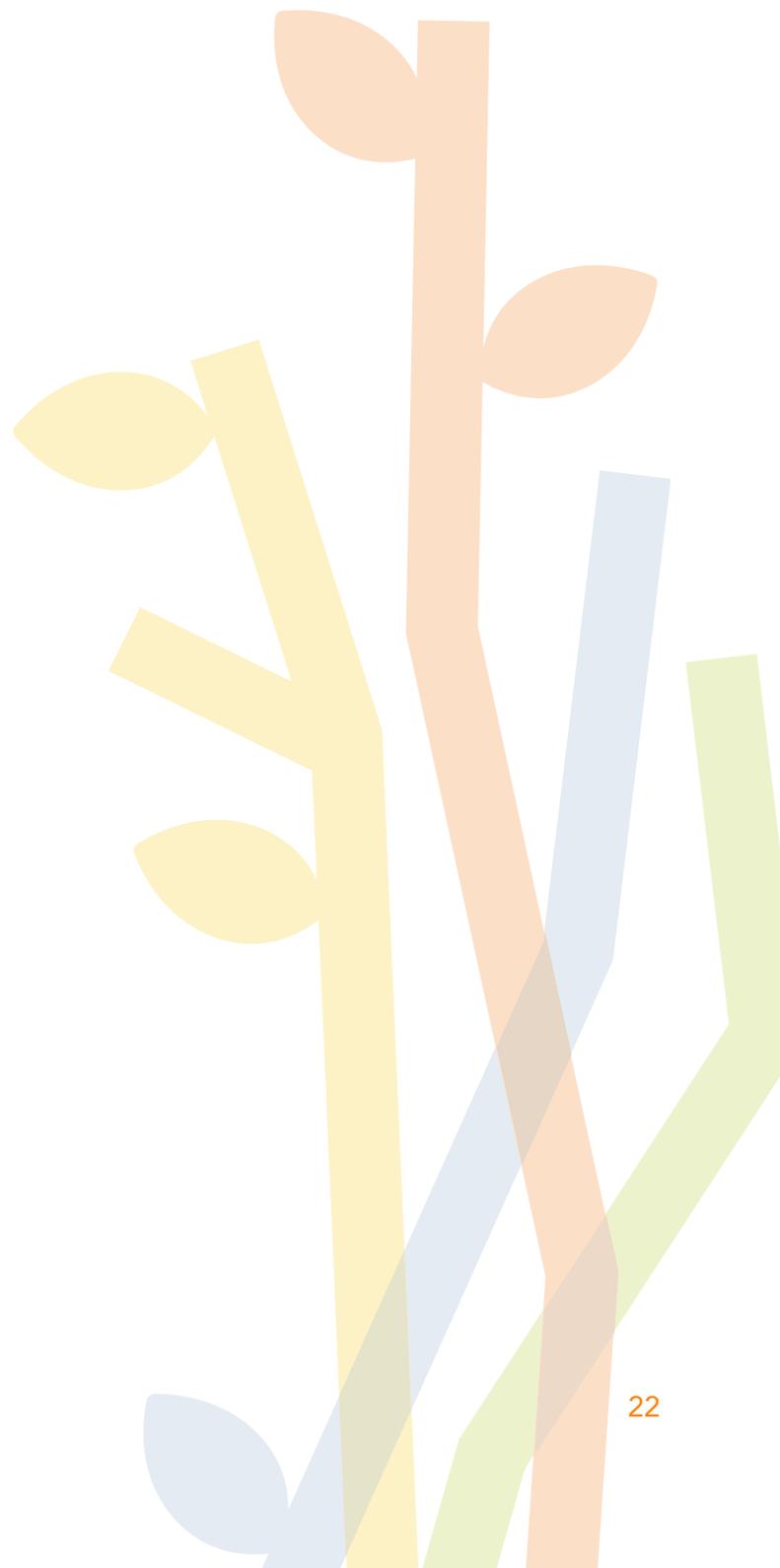
Perhaps the best indicator of strong collaboration is submitted applications for joint funding. While a minority of fellows have submitted grants with hosting institutions (12%), these have had big impact on the individuals and institutions involved. More than one fellow has successfully secured fellowships from their AST to pursue a PhD with their host. Fellows have also successfully co-lead multi-year grants with their hosts from prestigious funders such as BMGF and Wellcome Trust.

‘When you get skills, you have to write a proposal, get funding and work with them. If you have a skill, it is a sharp knife but if you put it down for too many years it becomes dull.’

‘I got the grant funded by the Bill & Melinda Gates Foundation to carry out research on “Developing indicators for phenotyping food quality traits in yam species.”’

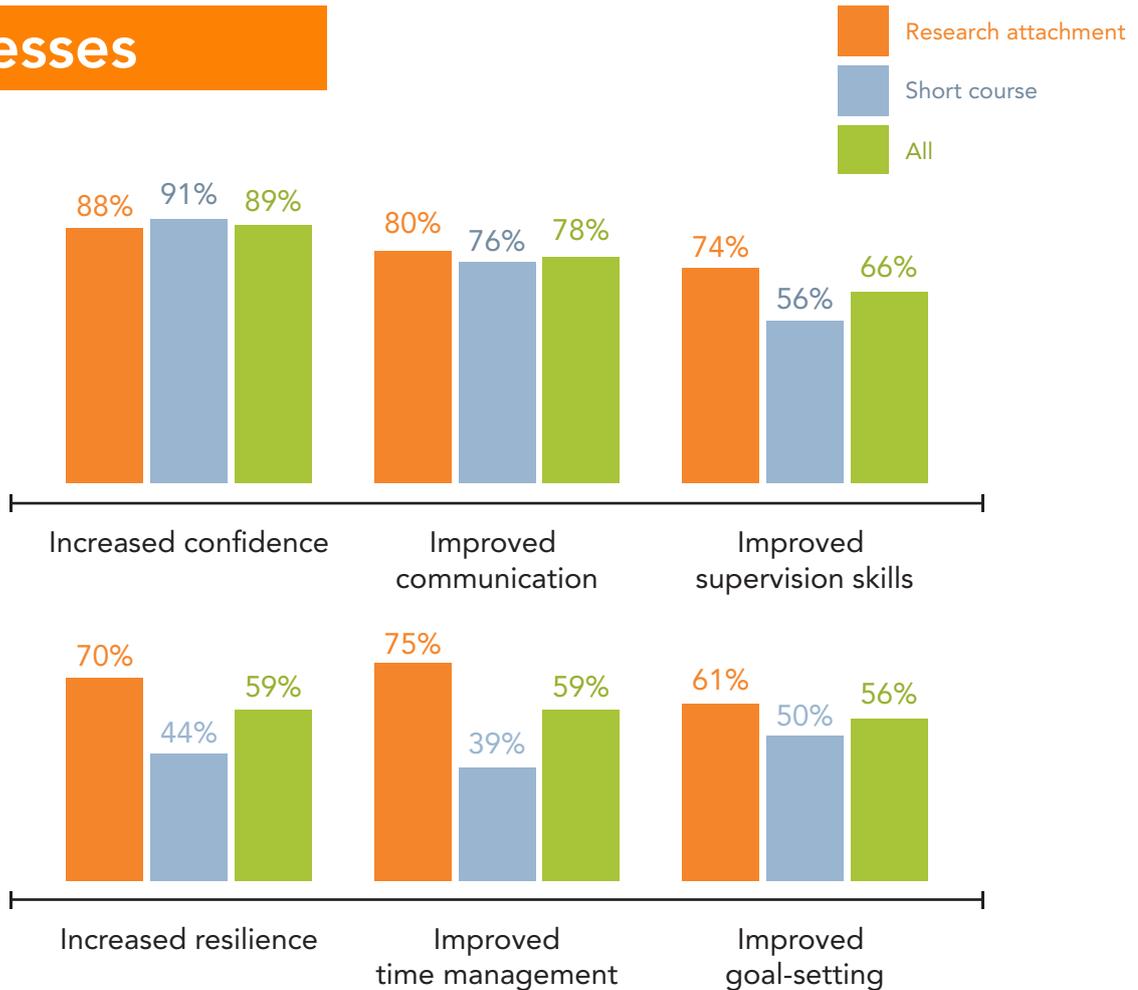
‘Due to the skills I gained in writing proposals, my team won a grant worth \$75,000 to study nutrient retention in dried tomatoes in Nigeria.’

Impact for fellows:
**Personal
development**



Impact for fellows: Personal development

Successes



Examples of skills learned

Constructive feedback practice

Improved communication and team work

Practice setting and meeting objectives

Increased awareness of self and others

Honed presentation skills

Exposure to new perspectives and ways of thinking

Time for creative thinking

Accounts of success

'Due to the fact that some of the changes I had to make to my writings and presentations were very drastic, they were initially met with a lot of skepticism. I had to do a lot to convince my supervisors, and also had to stand my ground. Once I had won them over, they started using bits of my new style to instruct the others. This was a clear win for me and a real pat on the back!'

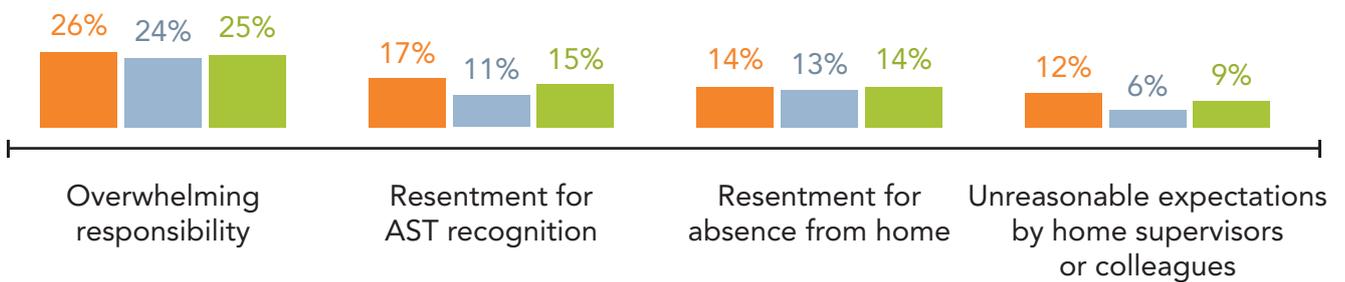
'My work has changed; I am now aiming for excellence at a global scale. Interacting with people who shape the world's thinking is phenomenal. I met professors whose writing I have read and cited and it completely changed me. I now focus to not only being a great scientist, but being named as one who made great advancement to knowledge/innovation to the world. It made me realize that we may

operate at regional/continental level, but need to think at a global level. More science from Africa should influence the world, rather than the present discourse where others lead and we follow.'

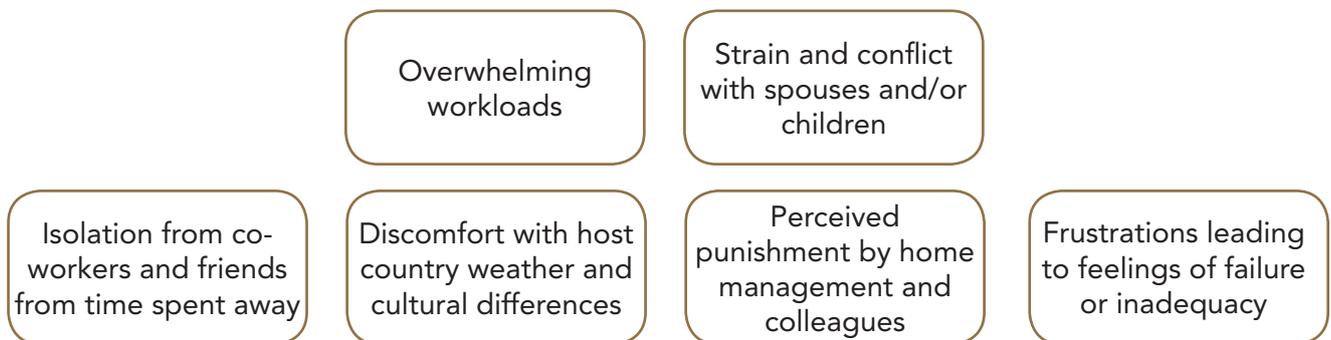
'I was able to negotiate with my supervisor about various aspects of my attachment such that we settled on experiments and other details that were fair for both my home and host institutions. This enhanced my negotiation skills, resilience and assertiveness.'

'My self-awareness has grown because now I no longer look down on myself but believe in myself. My confidence has increased tremendously, I find it easier to talk or contribute at seminars and meetings.'

Challenges



Examples of challenges



Accounts of challenges

'No one encourages me.'

'I face resentment from female colleagues to the extent that I feel ostracized.'

'I suffer silent resentment from my supervisors who feel I am always 'flying about' instead of doing the research I was employed to do at home.'

'One of the main challenges that I have faced has been to sustain the momentum, especially regarding the number of research outputs and the quality and quantity of presentations. This generally means that I now work even longer hours in order to step up my game even further as the expectations are constantly on the rise.'

'Indeed I can testify that the reward for a good job is more work.'

Impact for fellows

Personal development

Most fellows speak of transformative personal development during AST. A majority of fellows report increased levels of confidence (89%) and resilience (59%). Only 2 of the 123 responding fellows report they achieved no personal development of any kind.

'Before I became an AWARD Fellow, I never thought I would amount to anything really. So after that I developed self-confidence. Experience has taught me that I have something to offer and if you believe in yourself and that you have something to offer then you do whatever it takes to see to it that thing comes out.'

'After receiving the knowledge and skills, I have been advancing in a way that I am kind of an authority in this discipline and therefore it gives me a lot of confidence even to develop projects and be in charge.'

For both types of AST, an importance of focus and determination when making the most of their opportunities emerged as a reoccurring theme. A break from home institution roles and family responsibilities allowed the pursuit of activities they would normally not have time for, such as personal development, proposal/manuscript/thesis writing, or thinking creatively about their research. Additionally, supervisors and host colleagues were often willing to contribute valuable feedback on their writing and thinking which accelerated progress. For those experiencing a different culture, the exposure

to different ways of thinking and living were stimulating and thought provoking.

'I didn't know what I was supposed to do in life. I met inspiring men and women and you look at them and you say oh yes I can work it out. It is possible! And in them you see your dreams coming true. I can go for my dreams, however challenging it is; I am aggressive enough and confident to go for what I want.'

'Always talk, talk, talk. I used not to talk but when I went to the US I found people there really talk - so I started talking.'

To an unexpected degree for many, the soft-skills gained during AST were just as important as the technical skills. For example, many fellows described learning how to work together and share experiences in the lab. Frequent lab meetings, presentations and discussions with their supervisors and colleagues encouraged feedback and critical thinking to a greater degree than they experienced previously. This is reflected by 78% of respondents who directly attributed an improvement in communication skills to their AST experience. Many noted that goal-setting, planning and outlining clear expectations was exemplified by their hosts, resulting in improved goal-setting (56%) and overall supervisory skills for themselves (66%). This way of working was different from how they had operated at their home institutions. This sometimes renewed focus and led to more efficient progress towards goals. Along these lines, time management skills were improved in 59% of responding fellows.

'I was everything and nothing basically. But stepping out of that I knew very well that I needed to plan my research differently.'

'Locally I didn't have anyone to challenge me - that means nobody to add value. When I went to Stellenbosch, the challenges even on my technical work were so many that I knew I either work on the challenges or I finish with a PhD that will not meet global standards.'

There were many personal challenges associated with spending significant time away from work and family. Many fellows described the difficult balancing act they performed with their family responsibilities. For those leaving home, arrangements had to be made for child care and in many cases the children were quite young. In some cases, challenges with personal relationships could lead to breakdown and/or separation. There were also consequences for time spent away from home institutions. Some experienced resentment for their absence (14%) or for increased recognition from being selected for AST (15%). When they returned home, this could manifest in overwhelming increased responsibility (25%) and unreasonable expectations by supervisors and colleagues (9%). In one case, a lecturer was given so much teaching when she returned home she felt it was a punishment for her AST opportunity. Interviewed fellows have also reported frustration with the lack of progress they have made in implementing their skills acquired during AST. This can especially erode confidence when it is combined with increased demands by work and family.

'It was like punishment, but I took it positively because I know by having those challenges I'm learning. I was going to work hard for them to know that I cannot be stopped by being given a lot of work to do.'

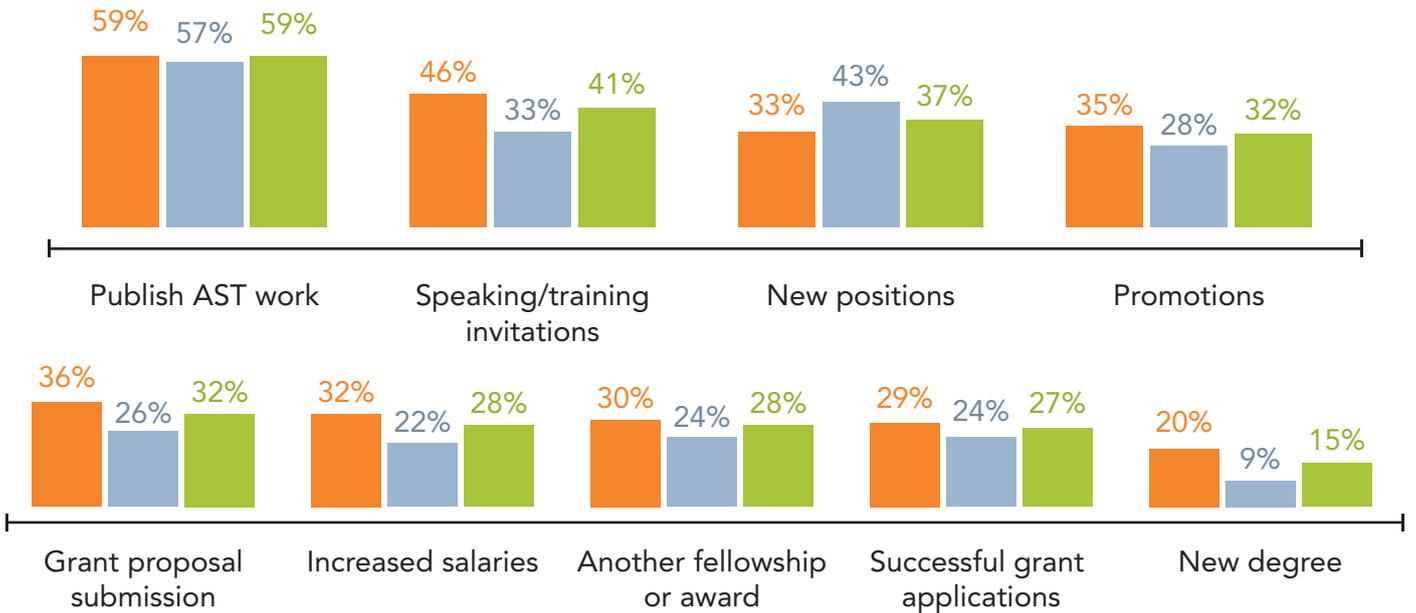
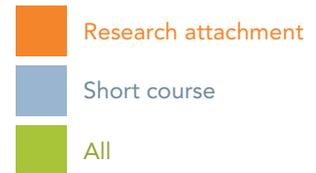
One common practical challenge was the weather. Women who went to countries with cold weather were often not prepared and had to spend time when they arrived acquiring warm clothes. This was often a burden financially. Many who had done their AST in South Africa pointed out the difference in the heating conditions in their accommodation. Several fellows were also expected to live in shared housing while on attachment which was not aligned with their expectations and preferences.

Impact for fellows:
**Career
acceleration**



Impact for fellows: Career acceleration

Successes



Examples of success

- Fellow elected as Vice President of African Society of Mycotoxicology
- Successful consultancy with FAO
- Appointment as co-editor of a South African Animal Science Journal
- African-German Network of Excellence Grants for young scientists award
- Promotion to Director of Research
- Promotion to Associate Professor after 4-year delay
- Submission of PhD thesis
- Connections for post-doctoral research
- Additional fellowships and training grants
- International speaking invitations
- Publication in high impact journals
- Blog development
- 3rd African-Wide Women and Young Professionals in Science Competition award
- University governance committee appointments
- 2016 Young African Leaders Initiative award
- Mandela Washington Fellowship

Accounts of success

'After completion of my AST, I was promoted to a managerial position; now I'm manager for the Centre of Infectious Diseases and Biotechnology and lead about 38 staff with increased salary.'

'Based on my experience in assisted reproductive technologies in cattle I was awarded a Norman Borlaug fellowship to study the same in goats.'

'I got a grant funded by the Bill & Melinda Gates Foundation to carry out research on "Developing indicators for phenotyping food quality traits in yam species.'

'After the training, I was offered a job opportunity as an Associate Director of a Makerere University - Cornell project, focused on training agricultural researchers to be gender responsive.'

Career acceleration

AWARD assumes the skills and networks developed through AST will help accelerate the movement of women into influential positions in agriculture research and development. Fellows report their successes focused attention on them and people approached them for advice more often than before their training. Often new skills led to new responsibilities and opportunities to contribute ideas in more influential committees. Approximately a third of fellows indicated career progression including promotions (32%), new positions (37%), and increased salaries (28%) as a direct result of their AST. In one fellow's case, she was transferred to the office of the president after returning from AST and oversaw a special initiative to promote livestock production in Malawi.

'Many times when you are not able to get what you want, you digress, you end up doing all sorts of things for survival. I didn't have to do that, I just focused on what I want and have been moving from one level to the next.'

Since 85% of the responding fellows are from universities or research institutes, one would expect to see new degrees, publications and grants as a result of successful AST. Only 15% of fellows attained a new degree, however since a prerequisite was at least a MSc to apply for AST, new degrees would be at the PhD level which

may still be ongoing. Several fellows described in their interview how their host supervisor either became their PhD advisor or connected them with someone else who took up that role.

As mentioned above, many fellows wanted AST to increase their publication record for promotions and grants. Over half of responding fellows (59%) successfully published articles as a direct result of their AST. Many submitted new grants (32%) and many had grants funded (27%). Many interviewed fellows reported their publication record was improved not just by numbers but also by the quality of the journal. Publishing in more prestigious journals initiated invitations to international conferences or committees. AST resulted in fellows receiving speaking/training invitations (41%) or another fellowship or award (28%). Some fellows have also been asked to serve as reviewers for journals. One fellow has been invited to sit as an examiner for doctoral students in Ghana. This was paid work and added to her promotion package. In an extreme case, a fellow's publication record held her back from promotion for 19 years. After AST, she published several papers and obtained her PhD. Since then she has been rapidly promoted through the ranks and is now a center director at her institute.

'I was never in management before and this is one of the biggest centers in the region. So people thought I came from nowhere. I didn't come from nowhere, I came from AWARD.'

Overview

Impact at home

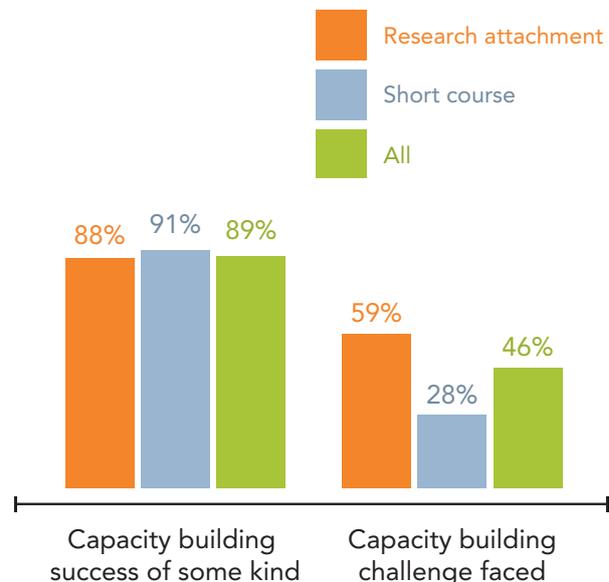
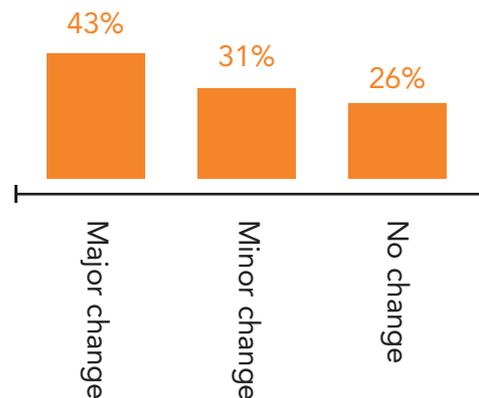
'You just don't do research and put it on the shelf. You do research to impact the people. I am now an advocate for research for development.'

The first two phases of AWARD have focused predominately on individual capacity development through fellowships. It assumed empowered women scientists could create change and build capacity for agriculture research and development through their institutions, communities and governments. The term 'capacity' is used here to signify the 'capability of people, organizations and society as a whole to manage their affairs successfully.'¹⁴ Capacity building can occur at three levels: individual, organizational and societal.² Fellows contribute to their colleague's development and pass on their own individual level capacity gains. They make changes to their institution through skills, knowledge and infrastructure to build organizational level capacity. They engage, educate and create products for their communities increasing capacity at the societal level. Within the societal level, fellows can also influence regional, national and international decision-makers and affect policy change. The majority of fellows (89%) report a capacity building success of some kind at their current institution. Just under half of fellows (46%) report facing some kind of capacity building challenge upon their return. This section presents examples of change at these three levels and barriers experienced by some fellows.

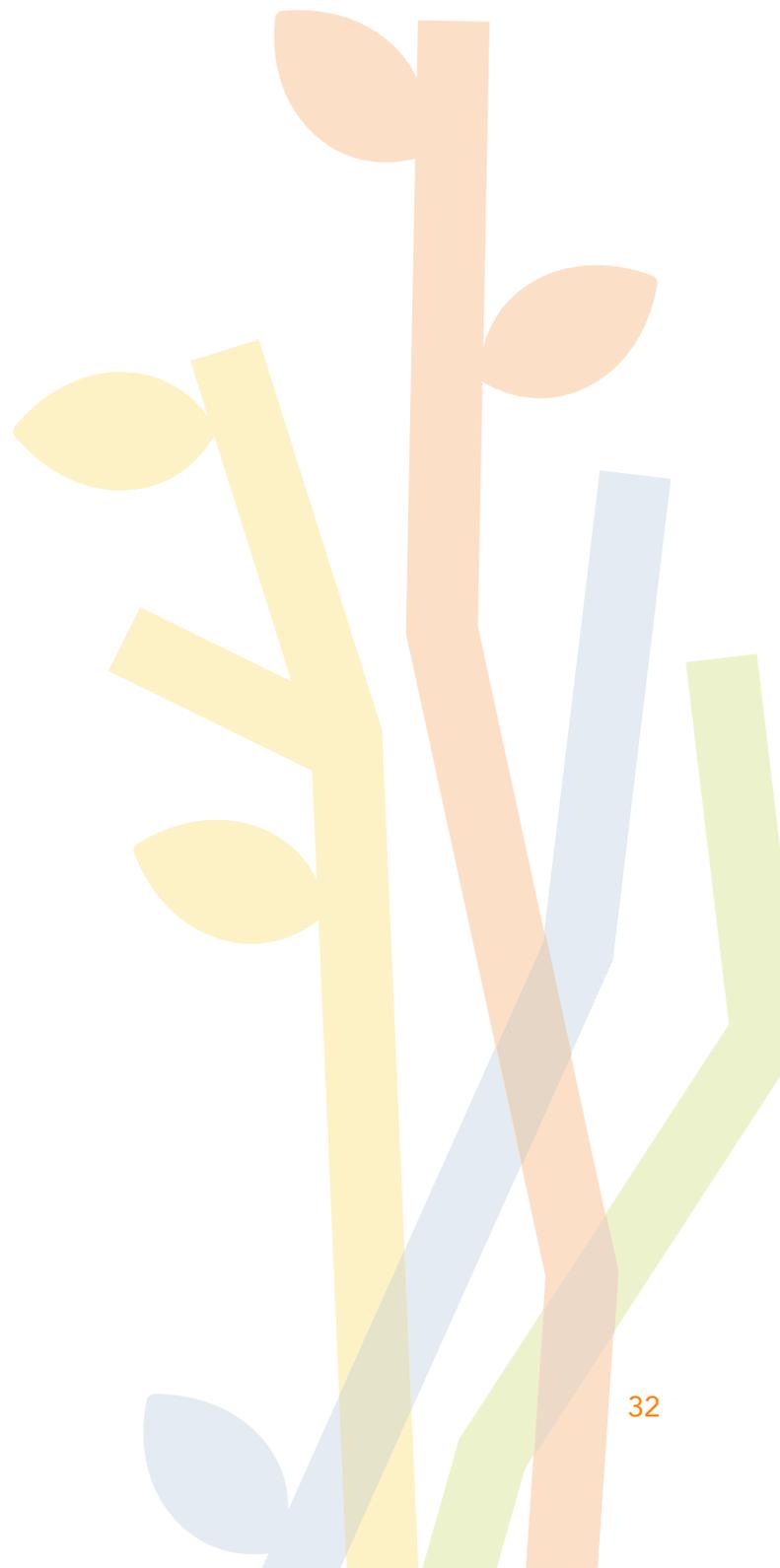
Categories explored

- Individual capacity building
- Organizational capacity building
- Societal capacity building

Change in fellow's home organization's networking, visibility and access to scientific resources

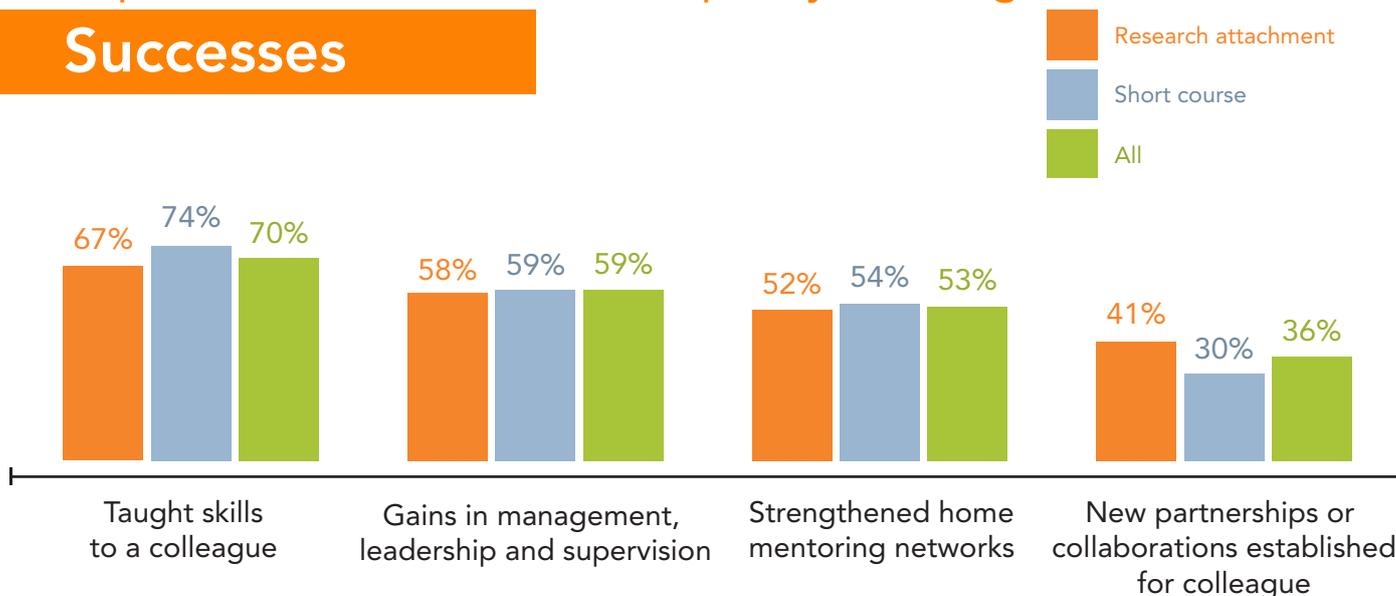


**Impact at home:
Individual
capacity building**

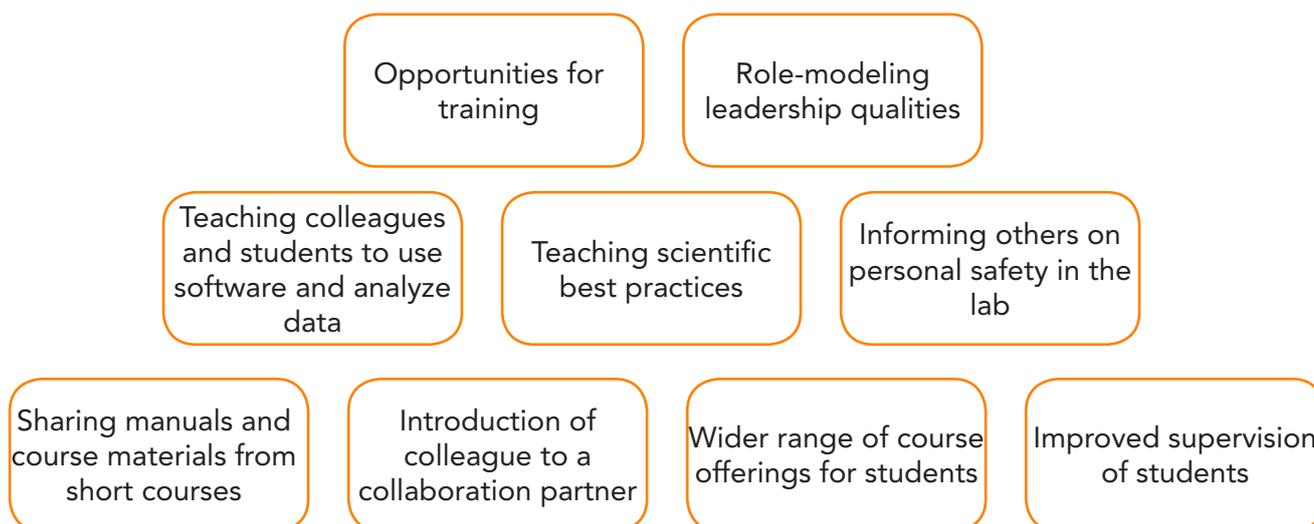


Impact at home: Individual capacity building

Successes



Examples of success



Accounts of success

'I set up meetings with my students, and I confidently guide them through the process of conducting research and setting goals for themselves. The experience is a result of what I learned and observed in the host AST institution.'

'As a trainer at the institution, I have been able to cascade the knowledge I acquired during my AST to the students that I teach and supervise. This is in the areas of effective communication, leadership skills and issues related to the environment which I effectively built into my lectures to the students.'

'The new skills that I acquired have been and will continue to be passed on to my students in all related classes that I teach. Furthermore, one of my PhD students has picked up interest in transient expression of virus-like particles for vaccine production and she may be spending some time at the John Innes Centre [host] to undertake part of her PhD research work.'

Individual level capacity building

Returning fellows bring their experiences and skills back to their home institutions. Teaching some kind of new skill to a colleague was reported by 70% of returning fellows. These skills can range from technical skills such as how to use a new software or piece of equipment to skills associated with scientific best practices. Several fellows described how data analysis skills were particularly desired by colleagues. The manuals and course materials from short courses have become valuable shared resources at home institutions. Entirely new platforms and capabilities have been set up in home institutions (24%). Examples of such technologies include vitamin A and aflatoxin analysis.

Less technical skills are also shared such as effective collaboration, adherence to safety procedures, and lab organization. While very few fellows report a lack of relevance (2%) or lack of interest from colleagues (6%) in their new skills, many face a lack of facilities needed to utilize them (28%). One interviewee reported she could not perform the procedures she needed to carry out her experiments but had learned how to prepare the samples and ship them to collaborators for processing. She shared this way of overcoming her institution's gap in capacity through her network with her colleagues. Along these lines, new partnerships and collaborations were established for colleagues by 36% of fellows. Fellows described how they have worked to implement safety procedures such as the use of lab coats in their home labs. Some fellows described in their interviews how 'built-to-purpose' lab design facilitated procedures in host labs. Several have recreated these work spaces by writing grants and securing space. Several have also described how they would like to create these spaces but cannot raise the funds or change the mind-set of their organization's management.

'For me these experiences have been about also not waiting for the systems to become better or for when my boss makes it possible. I would rather make those little steps from where we are and soon maybe people will join in and maybe the environment will become better.'

Reports from fellows suggest many students have benefited from AST experiences through improved lectures and supervision. Many fellows have large teaching responsibilities at their home institutions (44% work at universities) providing both opportunities for impact and sometimes overwhelming workload. Once they had experienced first-hand cutting-edge techniques, they could speak about them with more authority in their lectures and expose students to new technologies. This also helped keep theoretical aspects of their new skills fresh when lack of capacity made it impossible for them to continue using the skills on a regular basis. Supervision responsibilities sometimes increased because of new qualifications obtained from an AST experience such as completing PhD research. This often resulted in improved supervision skills with 59% reporting gains in management, leadership and supervision. Based on interviews, it seems likely that hundreds of MSc and PhD students have benefited from supervision gains made by AWARD Fellows participating in AST. Several fellows also reported co-advising students with overseas AST hosts and sometimes even hosting them in their lab.

'Now I have a team. I have students working in my lab. I have PhD students, I have master's students so it has helped my leadership skills. It has helped me bringing in people and to build lives. Now I know that I am passing on the torch to the next generation. I know that when I leave there is not going to be a gap in my field. I want people to fill it up. A leader is not successful without a successor.'

Beyond direct teaching and supervision, 53% of fellows report establishing or strengthening mentoring networks at their home institution. By modeling new behaviors they found their influence grew and others sought out their advice. Personal qualities modeled by fellows include assertiveness and confidence. Many have used these qualities to particularly create opportunities and support their women colleagues. One fellow who looks to Wangari Maathai for inspiration described how her AWARD experience and AST unleashed her 'inner-lioness'. She described how other women noticed this great change and now seek her guidance and support. Some have extended these efforts by holding mentoring and empowerment seminars in neighboring universities. It was common for interviewees to express a deep commitment to mentoring. Some described how their AWARD mentor made such differences in their careers they felt a responsibility to share those benefits with others. The joy of feeling empowered is one many feel compelled to share.

'We watched a documentary on Wangari Maathai, a Kenyan woman environmentalist. I saw the way she stood for what she believed in and it just put out the Lioness in me to go all out and say 'Come on! If she achieved this much for her country I think I can do this as well'.'

'Many have gone through AWARD so if they all hold another woman's hand you'll see it is a wave that grows.'

Other culture changing qualities role-modeled by fellows upon their return include planning for impact and effective communication. One fellow now advocates research for development. When students come to her with ideas she asks them to reflect on how that research will help people. By doing this, she feels she empowers her students to follow their dreams and build the foundation for impactful businesses to start when they finish their studies. Open sharing of data was mentioned by several interviewees as something that happened in AST host labs but not at home. Sharing exercises such as lab meetings and seminars created an atmosphere of constructive criticism and productive feedback. Many have worked to foster these behaviors in their working groups at home. There can be resistance to this as some describe a protective culture at home where scientists are reluctant to openly share data and ideas. Some have experienced supervisors 'stealing' their work. Such experiences could result in a systemic lack of trust.

Several fellows described in their interview how unexamined assumptions and poor communication created dynamics preventing their colleagues from reaching their full potential. Questioning habits and opinions could be unpopular behaviors (12% report resistance to change) but many believed these efforts were worth the risk. One fellow in particular described how humble role-modeling was an effective

way for her to create change rather than making demands of her management. She made change in small steps that over time created a big effect. While only 7% of fellows report poor management as a capacity building challenge, some fellows decided to leave their home institution to find more productive working environments.

'I can understand how they [her host] are doing such good science and publishing because people critique each other. Here in this center everyone is doing their own science and hiding it and we don't like critique. When you critique me I think you are not appreciating my work so I don't take it kindly. But there, the critique is to build you.'

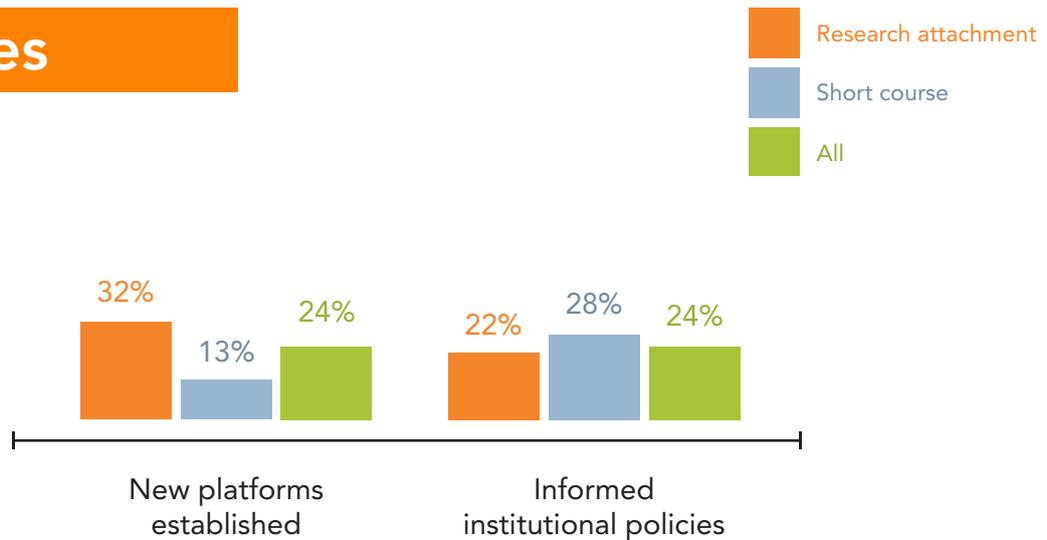
Finally, securing resources that create opportunities for others is an important activity that spans both individual and organizational capacity building. Indeed 28% reported lack of financial resources challenged their capacity building efforts. Many needed to rely on their newly formed networks to create and submit grant proposals. While many of these have been successful, many have not been able to raise the money needed to implement their desired change. Successfully acquired resources have been used to fund graduate students, buy equipment and set up independent mini-labs. These grants bring money to the home institution and attract new collaborations. One fellow mentored five women in her institution while they were writing proposals for government funding and all were successful.

Impact at home:
**Organizational
capacity building**



Impact at home: Organizational capacity building

Successes



Examples of success

- Improved grant writing skills for resource acquisition
- Geographical Information Systems Unit established
- Climate Change and Gender Studies Center established
- Mycology and mycotoxin laboratory at the University of Nairobi established
- CRISPR gene-editing capability established
- Improved stake-holder negotiations
- Development of gender awareness including establishment of Gender Mainstreaming Units and gender inclusion policies

Accounts of success

'Viral research has been actively ongoing since I returned from to my home Institute. Prior to that, research in viruses here was very limited. I am able to accept more students into my lab now than before and also using my new skills to impart knowledge about viruses to students and staff.'

'Now in my current institution, we developed Plant Biotechnology PhD curriculum. We [are] also in the process of developing Plant Biotechnology Institution which I am the secretary of the organizing committee. We are also working in establishing bioinformatics center in the university.'

'The research institution now ably works directly with or involves farmers who are the target; and collaborates with all players in the livestock value chain. This improvement was a result of my effort in sharing the AST knowledge and skills with colleagues in my institution.'

Organizational capacity building

For individual capacity gains to rise to the organizational level, they must be institutionalized in some way. For this process, fellows must remain at their home institution and create systemic change. As stated above, the majority of fellows remain at their home institution after returning from AST (76.4%). However, approximately 1 in 10 have left to another country (9%). Systemic change may be easier to achieve if fellows rise to positions of influence and power in the organization. Approximately 1 in 3 fellows (29%) were promoted to positions of increased influence. Two interviewees were promoted to center director within a few years of their AST. Fellows have also been appointed to gender focal roles in recognition of needed institutional change. In these positions, they have given seminars and informed policies. Overall, 24% of all AST fellows report they have informed policy decisions at their institutions. Mentoring networks have been established or strengthened by the AST experiences of half of the reporting fellows (53%).

'My experience during AST influenced me to introduce this policy to the food analysis laboratory in my department. It ensures that students and those working in the laboratory abide by simple safety rules such as the use of appropriate foot wear in the laboratory to avoid accidents.'

With increased influence, fellows have created or supported new research systems and capacity building processes. One fellow is now in charge of developing a new university for livestock research in Malawi. This includes coordinating the construction of the university itself, developing the curriculum and establishing the university's future cattle breeding stock. Another fellow has set up a center for climate change and gender studies where she teaches research methods including the skills she learned during her AST

short course. Yet another fellow created a center for industrial biotechnology. Examples of products resulting from that center are described in a later section. One fellow will develop a leadership development plan for her university as part of a 1-year Innovation Scholars leadership track program in collaboration with Michigan State University. Another was appointed to a team tasked with developing a food science master's degree.

The organizational level capacity gains highlighted here are impressive and created many opportunities for those around the fellow. Further gains could be made if more fellows increased their influence through promotion. It would be interesting to investigate the barriers fellows face when attempting to increase their influence at home. While only 12% reported resistance to change as a barrier to capacity building, most interviewees expressed some form of frustration with their perceived lack of progress towards institutional change. The work load at many universities include burdensome teaching commitments, research and publication of outputs, and committee/managerial responsibilities. Many struggle to meet promotion package requirements in all categories. Many interviewees also wished they had more time to spend writing grants and attending meetings that would help them gather the resources to make progress.

Capacity has also been built beyond home organizations to the scientific institutions in the regions where fellows work. Fellows have raised regional standards of research using the skills they gained during AST. One fellow brought cutting-edge artificial insemination procedures to Kenya after her AST at a world leading dairy cattle fertility facility in Brazil. While away, she adapted the protocols to suit capacities in her home region. Another wrote a successful grant application to train gender focal people at 20 institutions in Nigeria. A Kenyan fellow worked with her AST host to organize the first conference on aflatoxin in her region. She was also elected vice-president of the African Society of Mycotoxicology and keeps the region up to date on the topic. Currently, a fellow is organizing a climate change conference in Ghana. The

new livestock university being constructed in Malawi under the supervision of a fellow plays an important role in promoting livestock for the entire region. These activities raise the profile of African science, promote best practices, and provide opportunities for collaboration.

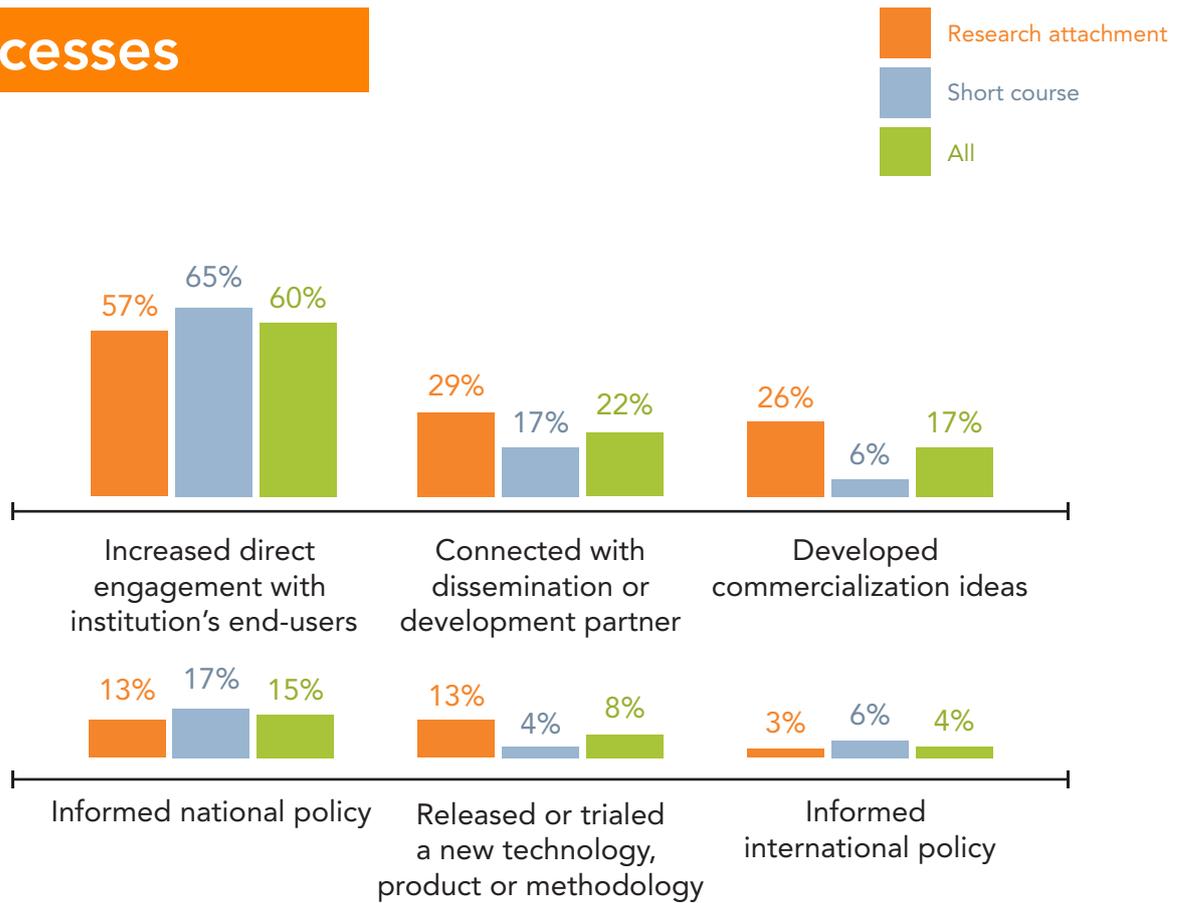
'I organized the 1st African Mycotoxin Symposium with my supervisor and we are organizing the 2nd next year. We were able to raise funds for this. I am now the Vice President of the African Society of Mycotoxicology.'

Impact at home:
**Societal
capacity building**



Impact at home: Societal capacity building

Successes



Examples of success

- Developing new products, standards and services*
- Served rural communities by educating young people and farmers
- Strengthened local extension services
- Brought the concerns of small-holder farmers to researchers and policy makers
- Informed policies at national, regional or international levels and provided recommendations to their governments

*(disease-free traditional food seedlings, yam breeding indicators, antibiotic herbal remedy, hygienic banana juicing procedure, tick-borne disease diagnostics, etc.)

Accounts of success

'As a result of the AST, I am currently setting up poultry farming as a way of fulfilling my purpose road map: I inspire a significant number of youths in Kenya to take up farming as a business.'

'As a result of the training, I have become a role model within my institute, and my locality. I am using the story of my personal career journey/achievement which I developed at the AST to inspire and advocate for girls to pursue continuing education and careers in science, technology, engineering and mathematics for innovation towards better and sustainable livelihoods.'

'I used the knowledge in my contribution in the development of a tree based energy strategy of ICRAF. I applied the knowledge in contributing to Kenya's national energy and petroleum policy.'

'My AST skills enables me now to offer more solutions to a wider community in Ghana than before. Through AST, I am also on the path of developing a vaccine suitable for the Ghanaian poultry industry.'

Societal capacity building

AWARD activities including AST aim to facilitate 'critical advances and innovations' that ultimately make differences in people's lives.² Furthermore, home institutions have mandates to serve the people in their region. This study focused particularly on how fellows have improved their institution's service to beneficiaries. Surveyed fellows report their current institution's end-users include farmers (91%), extension services (80%), industry (70%) and other scientists (67%). Over half (60%) of fellows report increased direct engagement with their institution's end-users as a result of AST. Fellows made differences in society by developing new products, standards and services. They have served rural communities by educating young people and farmers. They have strengthened local extension services and made efforts to bring the concerns of small-holder farmers to researchers and policy makers. As a result, they have informed policies at national, regional or international levels and provided recommendations to their governments.

'I enjoyed my science the most when I was talking to farmers to simplify my science and make it relevant to their normal daily lives.'

The work of returning AST fellows resulted in innovations and commercial opportunities that may provide economic growth in their communities. The translation of research into products and services is often a slow process. Thus it is a small number of fellows who have released or trialed a new technology, product or methodology (8%). About twice to three times that number (17% to 22%) have developed ideas in this space and connected with dissemination or development partners. While the numbers are small, there are some important examples. One fellow's research on disease control practices has produced disease-free traditional food seedlings (yam, cassava, sweet potato, and arrowroot) to distribute in the community. Another developed indicators used by breeders to determine the best kind of yams to grow for particular products. Another lab produces fungal inoculums used by regional breeders to test resistant maize varieties. The biotechnology center established by a fellow in Uganda has produced many products and protocols. Examples include a herbal remedy used against antibiotic resistant bacteria by the local hospital, an identification procedure for aflatoxin in fermented cassava products, essential oil extracts used by local women for cosmetic production, and a hygienic banana juicing procedure.

Many fellows have invested in the next generation of farmers, researchers and entrepreneurs by visiting local schools. There are many examples of how fellows have reached out to girls in an effort to give them a brighter future. One fellow runs a program for young girls and women, teaching them skills and talking to them about their health and nutritional rights. She taught them simple agro processing skills and sanitary pad production. These help girls stay in school and can be sold for extra money. The Ghanaian AWARD chapter runs role-modeling events for high school girls. One fellow introduced study clubs in rural Malawi to inspire girls to stay in school and value education. After returning to Nigeria, one fellow started an NGO to help children of small-holder farmers develop into successful future farmers. One fellow even appeared in a documentary made by her AST hosts to inspire young girls to participate in science in her region.

‘The role modeling events through AWARD have encouraged me and it taught me to say that I can also inspire others. I feel so happy and privileged.’

One interviewed fellow described how farmers are not sufficiently empowered or invited into the agricultural research process. Fellows have made efforts to increase communication between scientists and farmers. One fellow engaged with female chicken farmers in Kenya and developed poultry monitoring protocols. Another fellow started a project during her AST introducing an affordable new method of growing vegetables in rural areas. Her AST host institution monitored the progress of this project and made a documentary of the impact. Others have developed and encouraged sustainable cooking practices that protect natural resources. One fellow helps farmers protect their livestock by teaching them to identify ticks and treat tick borne diseases. She insists women and children be included in these education events. She applied for funding to support a tick-borne disease extension intervention. At the request of the government, one fellow trialed several disease control products with local farmers. Another

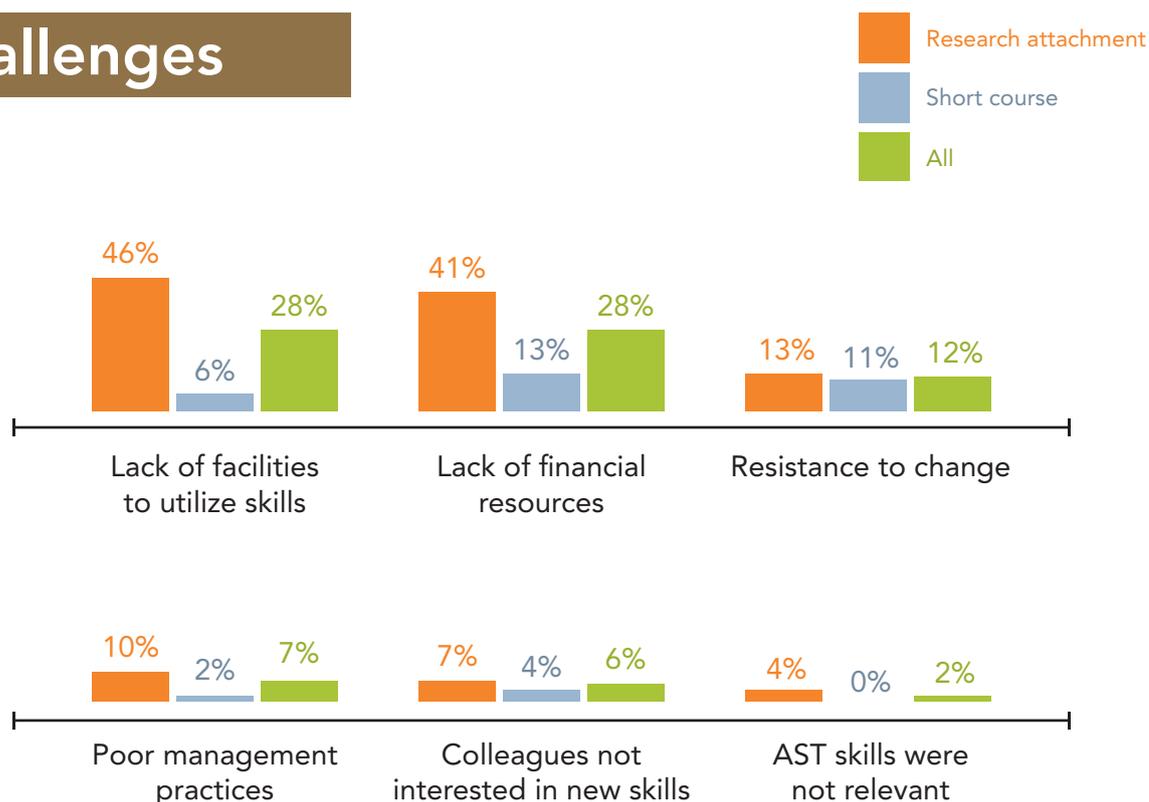
fellow applies the gender skills she learned from her AST short course to inform gender responsive extension services in her region. Fellows often stressed the use of participatory methods during their community engagement.

‘There are so many scientists who never think about the science they do and who they do the science for and so the farmers have been missing.’

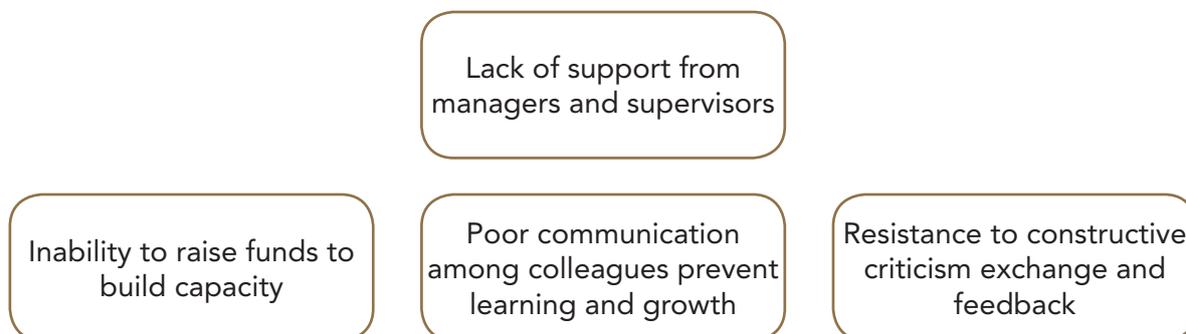
Skills, knowledge or partnerships developed during AST have informed some kind of policy decision for 37% of responding fellows. The highest percentage of fellows reported informing institutional level policy (24%). National policies were informed by 15%. One fellow contributes to Nationally Appropriate Mitigation Actions (NAMAs) used by the ministry of agriculture to reduce greenhouse gases during livestock production. Fellows sit on task force teams assembled around important food crop disease outbreaks or draft policies for poultry hatcheries. As part of a Right to Food Task Team, one fellow is working on a food and nutrition bill as a mediator for negotiations between local chiefs and the government. There are a few cases where AST experiences inform international policies (5%). In an impressive example, one fellow became a regional expert in aflatoxin following her AST. She wrote a report outlining the challenges and status of aflatoxin in Africa used by an African Union organization to focus control efforts on particular crops and regions. It will also be used to advise policy on moving crops between countries and establish safe concentration levels.

Impact at home

Challenges



Examples of challenges



Accounts of challenges

'It is a big challenge to train junior scientists and colleagues to conduct meaningful research at the research institution with limited government funding and where the research facilities are dilapidated, laboratory equipment is mostly old, the farm has few research animals and most repairs are not undertaken due to funding limitations.'

'Sometimes there are very high expectations from supervisors after attending AST programs. However to achieve such expectations, supervisors have to really be part of the process. If they are not, it becomes difficult to get results.'

'Without a well-equipped molecular lab, it is extremely hard to practice skills learnt. The opportunity to expose my student to some of the lab procedures and skills becomes just a dream.'

Opportunities



Aspirations and future challenges

The previous sections highlight impacts AST experiences have had on fellows, their colleagues, organizations, and the communities and governments in their region. Fellows have also faced challenges in their private and professional lives as a result of AST. Further agricultural and educational gains could be realized if fellows achieve the goals many have set for their future success. The following sections describes examples drawn from interviews of these aspirations and the potential challenges on the horizon.

When fellows described farmer engagement activities and their impacts on the ground, they radiate pride and emit a 'call to action'. It is not surprising many aspire to contribute more to the lives of small holder farmers. A fellow described how she loves working with farmers because her impact is limited only by her energy. She wants to work at the grassroots level using technology to improve farmer livelihoods. One wants to become a disease analyst at a research organization to empower village people to control disease in their communities. Along these lines, two fellows worked to develop kits to rapidly diagnose cassava brown streak virus and east coast fever in cattle during their AST. The kits are desperately needed but not yet ready for delivery. One fellow is passionate about teaching gender issues to address misinformation and misunderstanding across Nigeria and other African countries after she saw women suffering during her PhD field research. One would like to make an immediate impact on female farmers by producing disease-free indigenous 'women's-crop' seedlings through tissue culture. One ambitious fellow will keep working until she sees the day Nigeria unlocks the industrial potential of yam.

'If you want to do something - do it. You can't do it alone. Get the people along with you but if you realize that some are pulling you down, drop them – leave them. Don't waste your energy arguing.'

You just leave them quietly and ignore them. Pull those who want to go with you along.'

Several interviewed fellows describe uncertainty over the type of organization where they can make the most impact for farmers. They weigh the benefits and challenges of universities, research organizations, government agencies and the private sector or NGOs. Where is the most effective position to advocate for the needs of small holders? Each has their own politics and draw backs. Success and confidence bring the luxury of choice and disruptive ambition. They now believe they can make a difference but restlessly weigh their options, worrying they will lose the drive if they do not act fast. One fellow would like to be a full-time university lecturer because she enjoys mentoring young scientists. She might also like to start an NGO to use livestock production to improve skills for young people in science and business. There is a particular disease research organization one fellow wants to join but has been told she is over qualified and would be too expensive. One fellow knows her dream job but must wait for her children to grow older before she can do what it will take to follow her heart. These last examples highlight the difficulty some may face when changing sectors even if they determine it is the best course of action.

'Life for some people starts at 50.'

For those who want to pursue careers at a university or research institute, they still face trade-offs and challenges. Many interviewed fellows have ambitious plans for attaining full professor status. To start the process many still need to obtain PhDs. Finding the right supervisor can be difficult. Some would like to get PhDs with their AST hosts. Many hosts would like to do this as well but lack the funding to pay for expensive studenthip fees. Additionally, some have found they do not fit within the age limit of many fellowships available for international study. Organizations providing such opportunities may not be aware of the realities for African women that can slow their academic progress.

Once women obtain their PhDs and enter the tenure track system, they can face heavy teaching loads that prevent them from making progress towards their promotion packages. This could be one reason why more responding fellows have yet to be promoted as a result of their AST. They can also struggle with deciding when and how to conduct post-doctoral research. A post-doc is an important time when scientists hone their skills and develop their field of expertise. Once exposed to cutting-edge labs, fellows want to do their post-docs at international centers of excellence. However, funding again limits their opportunities as well as the time away from their home institutions and families. One fellow described an example of this conflict. She wants to become a senior lecturer but also do post-doctoral research. A post-doc would make her promotion slower but provide increased long-term security and expertise. She worries she will be too old when she returns from a potential post-doc. This is related to another complication of spending time away from the home institution. Fellows can become disconnected from their colleagues and local networks. This can hurt their influence over institutional politics and leave them isolated.

Difficulty publishing and securing grants are common barriers to career progression and scientific advancement. Many fellows lack the time or skills needed to bring their AST research to publication. While publications did result from 59% of fellows surveyed here, many report they still have unpublished data. Some are still unable to publish in internationally recognized journals. Raising money also remains a major challenge to most fellows. While 27% report obtaining grants due to their AST experiences, more resources are needed. Fellows pushing for independence need more space for their work, equipment, software, employees or students, and funds for travel and community engagement. Some suggest without funds, they have no leverage to gather support from their administrations to make change and build capacity.

Finally, fellows want to continue to grow and push themselves. They become leaders and managers through their ASTs and training from AWARD. Sometimes this happens too quickly or not quick enough. Interestingly, fellows who experience both scenarios want more leadership,

management and negotiations training. Many have found working outside their comfort zones and appreciating diverse personality styles rewarding. They want to push themselves to fill the leadership gaps they see around them. Even after the leadership training provided by AWARD, some fellows request short courses in the subject. It does not appear the AWARD course was insufficient but rather it built appetite. One fellow described how the initial training 'scratched an itch' and now she wants more.

'As much as we would want things to work in a certain way and we would want everyone to have that same passion to do and make a change, there is only so much you can do in terms of control outside you. The best is to work on you.'

The role of AWARD - emerging lessons

AWARD's staff and training have huge positive effects on the outcomes of AST. The contributions are critical before, during and after the placement process. There are many examples of successful facilitation and interventions made by AWARD and many examples of learning by the organization to improve.

Before

AWARD's training and facilitation for successful AST begins long before a placement. **The fellowship itself, with its three pillars of mentoring, science and leadership, provides the foundation for fellows to make the most of their AST opportunity.** Fellows described in their interviews how training received paved the way for their AST successes. Training in the following emerged as particularly important:

- Women's leadership
- Scientific writing
- Purpose road map development
- Myers-Briggs Type Indicators and applications
- Negotiation skills

Early consultations with AST coordinators helped fellows. During the initial mentoring workshop, AST coordinators had preliminary discussions about potential ASTs. They answered questions and discussed if the opportunity would be well matched to the fellow's situation. Mentoring played an important role at this stage for many who discussed with their mentor how to incorporate AST in their purpose road map. Taking this a step further, it was suggested proposal development would benefit from SWOT (Strength, Weakness, Opportunities, Threats) analysis with a coach.

A few fellows have felt conflicted over their AST opportunity. Some may not want to seem ungrateful by expressing concern over an opportunity's suitability. In the early years, some may have accepted placements that were not maximally beneficial. AWARD has incorporated this learning into its process and that risk is consciously addressed. All sides agree a tight relationship between the needs of the host and the fellow is important for successful AST. In more

recent years it has become clear this alignment of needs should include the home institution as well for the very best outcomes.

During

Feedback from fellows highlight 3 main areas of AWARD's role during the AST summarized as:

- Negotiations
- Finances
- Attachment flexibility

The AST experience is an ongoing process of negotiations between the fellow, their hosts and their home institution. AWARD coordinators play an important mediating role in all these negotiations. Coordinators have intervened in cases where the fellow's home resisted granting leave for AST placement. At institutions where multiple AWARD Fellows are based, approval for AST placement is easier as the administration already recognizes the value of AWARD experiences for their staff. This points to the value of ongoing engagement between AWARD and home institutions. In a case where a new provider of short courses was being trialed, a member of AWARD staff attended alongside a group of fellows to assess the quality of the experience. For one AST, there was a conflict between two fellows posted on the same AST project. AST coordinators played an important role mediating this relationship and communicating with the donor organization.

Financial considerations such as stipend and accommodation costs were areas where progress has been made by AWARD. A few early ASTs experienced delays in receiving resources as logistics were worked out with host organizations. In the clear majority of cases, these types of issues are small and well handled by the organizations involved.

Many fellows expressed appreciation for AWARD's flexibility in handling unexpected issues that transpired for fellows while on AST. Many fellows found being without their family very difficult. AWARD allowed one fellow to break her AST into two 3-month periods to return home

when her son became ill. Another combined a promotion interview at her home institution with a conference she was attending while on AST. AWARD gave her flexibility on her return flight for a much-needed visit with her family. A fellow brought her daughter with her back to her host country for Christmas. It was a really special time for her and her daughter and allowed the fellow to focus on the rest of the AST. One fellow described how early in her placement AWARD reached out to her to see how she was doing. She really appreciated that encouragement.

After

As described in other sections, the experiences of women during AST are overwhelmingly positive and beneficial. After such an empowering experience many come home with ambitious plans. When they return they face challenges and barriers they must overcome to reach the goals laid out in their purpose road map and reinforced/refined through AST. Much of what they would like from AWARD once they are home can be summarized in the following sections:

- Increased number/continuation of AST
- Further development of skills
- Increased topics/AST hosts
- AWARD network/country chapter facilitation

Many fellows urged AWARD to continue offering AST. Fellows described how they knew so many people who would benefit from such an experience. Some would like placements and training for industrial and economical aspects of agriculture in addition to biological research. Some also suggest fellows would benefit from even more course choices and an expanded range of host institutions. These requests are evidence of how valuable the experiences have been for fellows. Any potential new hosts or courses will undoubtedly need to be balanced with the time it takes to ensure the new opportunity meets AWARD's high standards.

As mentioned before, fellows draw upon their AWARD training when they return home to negotiate difficult situations with their families and institutions. Some would like additional training to refresh and help them bring their training to bear on emerging issues. Some very

practical training was requested. For those who attended a short course for AST, there was sometimes a basic and advanced module. They felt they needed the advanced module as well to take full advantage of what they had learned in the basic or introductory class attended for AST. Some wished AWARD had funds to help them purchase a key piece of software necessary to utilize short course training at home. Along these lines, some suggested AWARD could have a matching pot of money for post-AST projects.

Many fellows describe how they made valuable connections not only with their hosts but with other AWARD Fellows during AST. This has expanded their network and provided new opportunities. One fellow 'cold-called' an organization after seeing a brochure and an AWARD Fellow at the organization provided an easy entry point to collaboration. Many see the country chapter work as a good way of working together and staying connected more broadly. One fellow suggested a virtual space on the AWARD website for alumni to share experiences, job opportunities and support. This could include online webinars or virtual meetings coordinated by fellows and country chapters. In this way, fellows could build opportunities for themselves and each other, harnessing their collective power to have greater impact.

Concluding remarks and way forward

This study relied upon engagement with AST fellows through interviews and an online survey. It found many examples of impact achieved through AST and examples of challenges fellows face as they create change for themselves, their organization and their society. The AWARD training received by fellows and the development of their purpose road map was harnessed during AST to improve scientific agency. This increased ability to act within the scientific community led to career progression and change. Particularly impressive personal development gains were made for the fellows in the areas of confidence, communication and networking. Scientific advances included new techniques, technologies and publication. In a way, the AST experience acts as a catalyst for fellows to embed their AWARD training. Away from the habits and expectations of home, they can trial different ways of reacting to challenges. **It is highly likely that fellows would not have gained as much from their AST if they had not received the mentoring and leadership training included in their fellowship.**

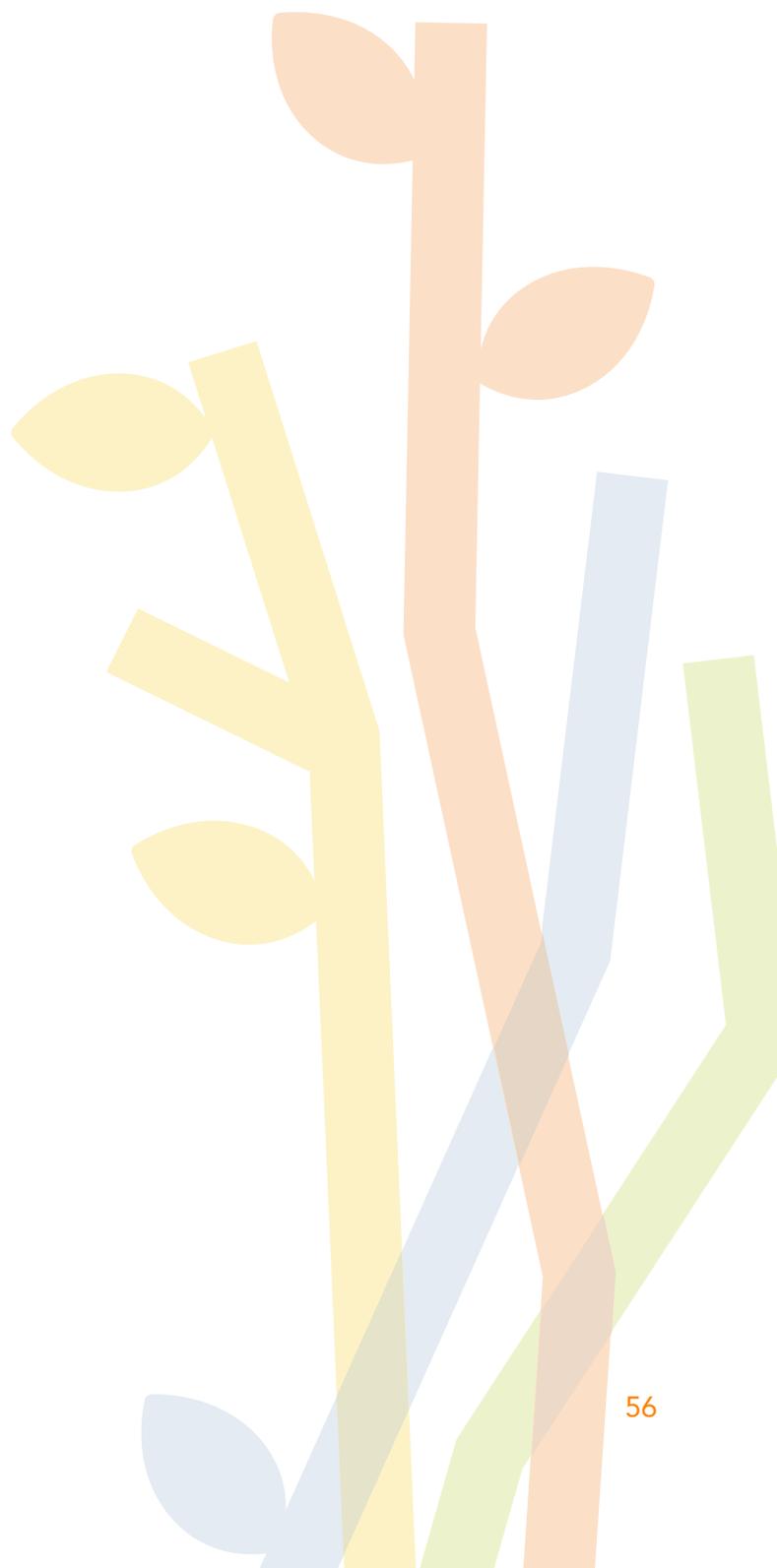
Capacity building successes were also reported by fellows as a result of their AST. It seems likely even more successes would be achieved with additional planning and organizational participation. **Increased prior engagement with both host and home institutions may be a way of laying the foundation for success after an AST.** Many fellows reported frustration with their capacity building efforts. Developing fellows can become threats to the status quo. An identification of benefits by home institution management before AST could bring them into the process early on. Additionally, a possible mechanism for AST sustainability is increased financial support from host institutions. By fully understanding host motivations and beneficial opportunities, AWARD may be able to gather greater support, commitment and contributions from host institutions. In this way, AWARD acts as a knowledge broker between the fellow, her home institution and the AST host. This mediating role could help maximize organizational 'buy-in' and help the fellow translate her personal successes into greater impact for others.



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Recommendations



Recommendations for AWARD: An AST impact road map

For an AST to deliver maximum capacity building and wider impact, more planning with the home institution and/or community may be required. **The AST is a 3-way partnership mediated by AWARD between the fellow, home institution and the hosts.**

Ideally, AST objectives benefit all three partners. A SWOT (strengths, weaknesses, opportunities, analysis threats) analysis and negotiation could result in objectives that meet the need(s) of all three parties. It is particularly important for each party to understand the risks the others are taking in the activity. Plans for how to achieve shared objectives and mitigate risk can then be prepared by each partner. This negotiation process clarifies expectations and creates a foundation for the productive communication dynamics necessary as the AST progresses. The greater the alignment of objectives to the needs of all parties, the greater the chance of success.

Example considerations among the partners:

Fellows may find themselves in a situation where they realize their AST is not serving their purpose road map. If this happens, there may be a lack of motivation and resilience to the challenges they face.

This is uncommon as AWARD has facilitated the planning for individual impact quite well with many examples of success.

Mentors are very important in that process. AWARD should continue to stress the importance of looking towards one's purpose road map when preparing AST proposals.

Home institutions may not value the skills brought back by the fellow. They may resent the fellow for being absent from the institution and be resistant to changes suggested.

Given AWARD's impressive track record and reputation in Africa, they are uniquely positioned to help institutions understand the benefits they could reap if they work together with the fellow in their aspirations.

Fellows have also drawn upon their training with AWARD on negotiation and assertiveness and this should be encouraged and supported.

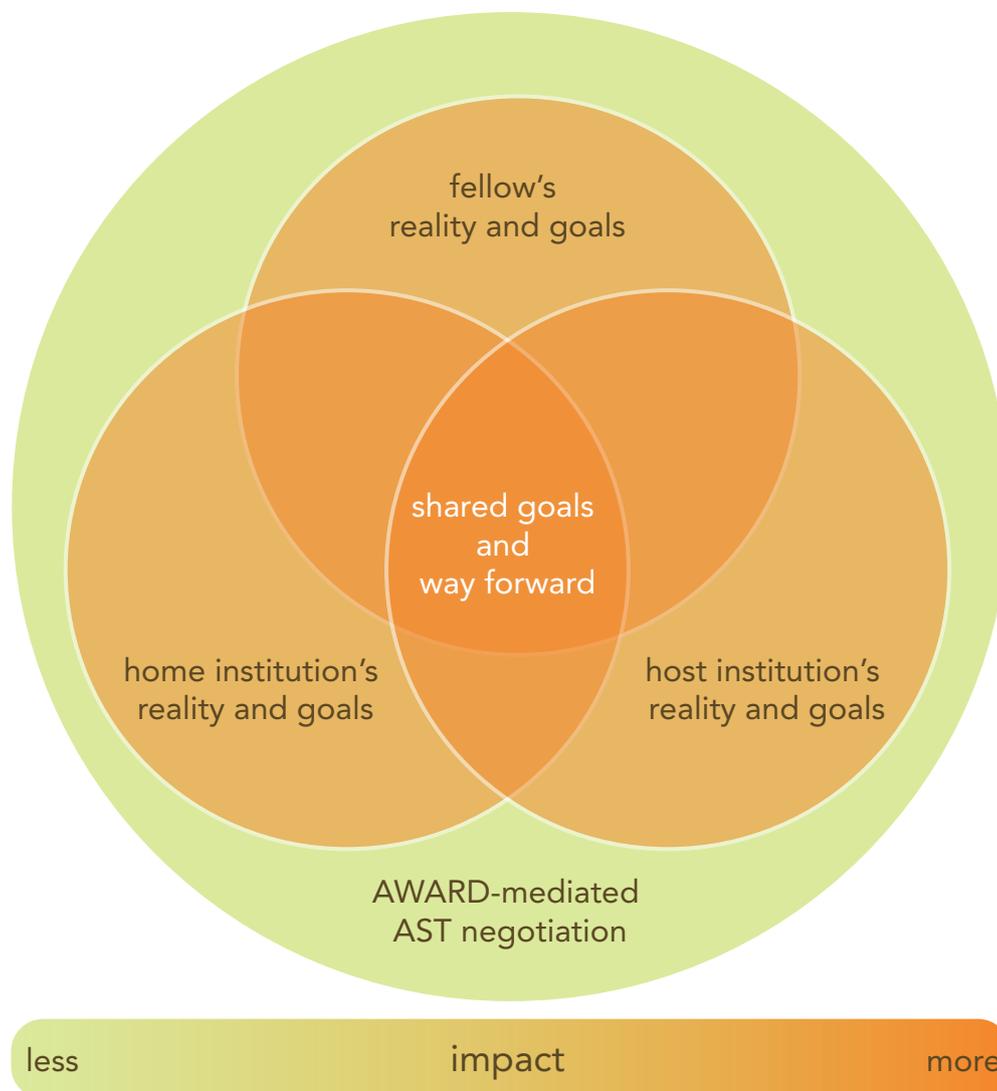
Host institutions may not see a future value in a relationship with the fellow if their interests are not appropriately aligned. This will limit future publishing and funding opportunities.

AWARD should ensure the host is sufficiently engaged and in the planning process. Language or cultural differences can impede communication between the partners.

Fellows should engage extensively with their potential host in advance to create a concrete work plan.

Answers to the following questions could result in an impact road map:

- 1 What will the fellow, home institution and host gain from the experience?
- 2 What do each of the parties need to do before, during and after to realize the gains?
- 3 What are the risks being taken by each partner during the AST process?
- 4 How will the risks for each partner be mitigated?
- 5 What does AWARD need to do during the process to facilitate the activities of the others?



AWARD mediates a 3-way negotiation between the fellow, home, and host institutions to maximize AST impact

Recommendations for AST hosts for research attachments

Host institutions and supervisors make a big difference to the outcome of AST attachments. Actions at the institutional and supervisor level can facilitate a smooth process. There is also a lot of value the organization can gain from hosting a fellow and starting a relationship with AWARD.

- Feedback from hosting institutions indicate the following benefits of AST placements:

Increased visibility in Africa for host

Fellows contribute to hosting lab research

Collaboration is initiated with fellow and home colleagues

Increased understanding of scientific and agricultural challenges in Africa by host

Contribution to host institution's food security goals

Strengthened host organizational gender equity policies and practices

- The following can help ensure a smooth experience and maximize value addition to the host:

- 1 Be open about your expectations and concerns as early as possible and keep AST coordinators informed.
- 2 Provide ample time to sort out arrangements for the fellow's placement.
- 3 Ask yourself how you might benefit from having an AWARD Fellow at your institution and work with the fellow to achieve those goals.
- 4 Find out what goals beyond science objectives the fellow has for their attachment and see how you might facilitate these goals.
- 5 Appoint a focal person (not research supervisor) to periodically check in with the fellow and coordinate opportunities for them at your organization.
- 6 Ensure hosting lab appoints another researcher to look after the technical needs and training of the fellow while they are on attachment.
- 7 Think about how the relationship with the fellow could be maintained and turn into opportunities in the future.

Recommendations for fellows participating in AST

Numerous fellows were asked what advice they would give to others getting ready to go on an AST. Based on these responses and other observations of what went well and what was challenging, several recommendations have emerged. For more advice and inspiration, please see the quotes from fellows presented in Appendix F.

Some of the advice can be summarized by the following recommendations:

1

Be sure the opportunity in front of you fits your needs and your purpose road map.

2

Always be assertive and open about your expectations or concerns. Keep the AST coordinators informed of your circumstances and bring up problems as soon as you can.

3

Be prepared. Research the logistics of your new environment and prepare yourself for the research and learning you will undertake.

4

Think about other goals you may have beyond your science objectives for this unique opportunity outside your normal responsibilities.

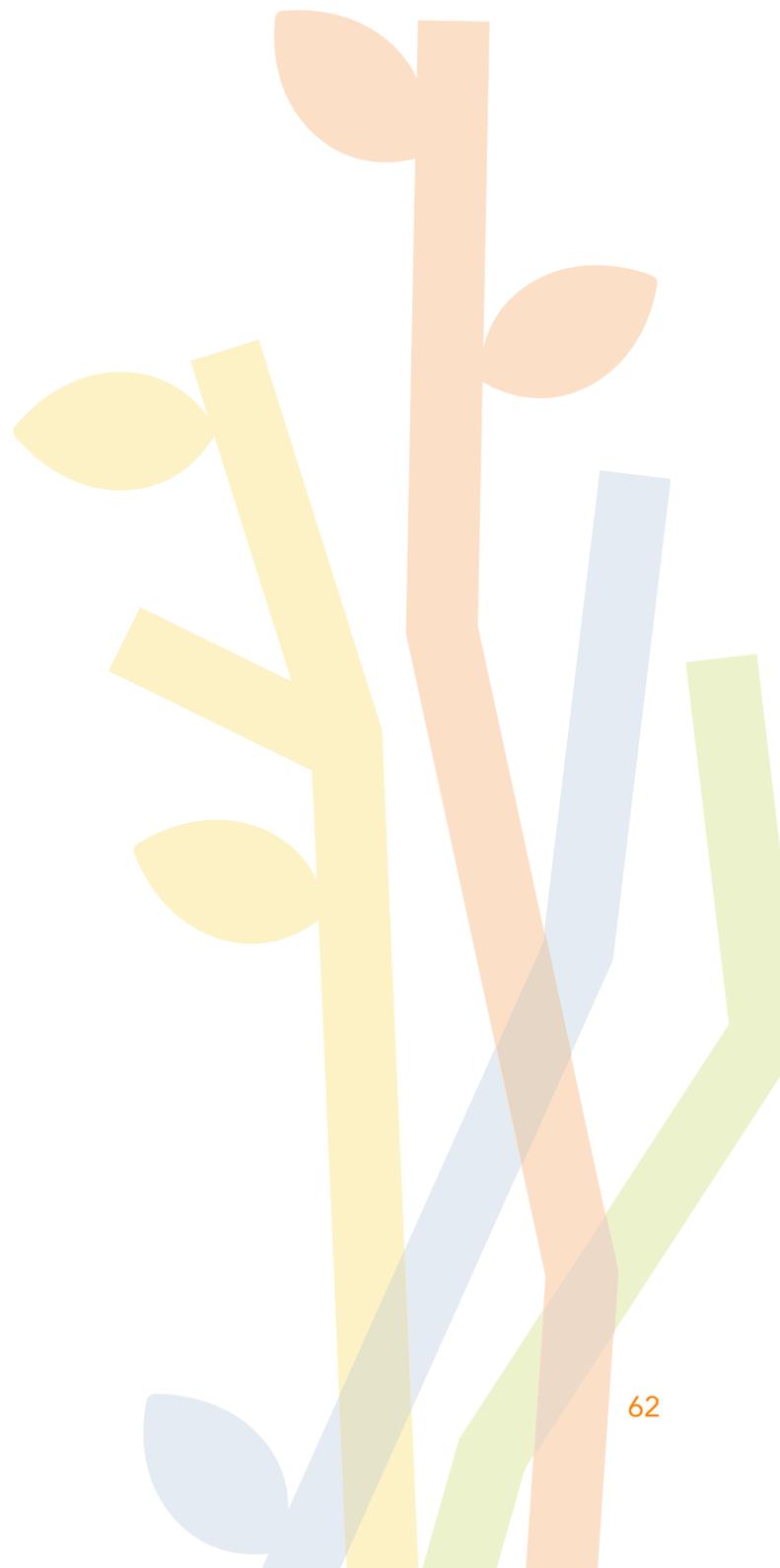
5

Ask yourself how your home institution and community can benefit from your AST. Make plans before and during the AST to ensure you deliver those benefits when you return.

6

Think about how the relationship with those you meet on AST could be maintained and turned into opportunities in the future.

Appendices



Appendix A: Host institutions

2nd Australian/OceaniaFoods Training Course on Food Composition & Oceanfoods

African Doctoral Academy (ADA)

Agropolis Fondation

Arizona State University

Association for Strengthening Agricultural Research in Eastern & Central Africa (ASARECA)

Bayer CropScience

Biosciences eastern and central Africa (BecA-ILRI)

Bozeman Fish Technology Center

CARE International

Commonwealth Scientific and Industrial Research v (CSIRO)

Cornell University

Donald Danforth Plant Science Center

Dow AgroSciences

DuPont Pioneer

Ghent University

Institute for Capacity Development

International Center for Agricultural Research in the Dry Areas (ICARDA)

International Center for Tropical Agriculture (CIAT)

International Centre of Insect Physiology and Ecology (icipe)

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)

International Fertilizer Development Center (IFDC)

International Food Policy Research Institute (IFPRI)

International Livestock Research Institute (ILRI)

International Maize and Wheat Improvement Center (CIMMYT)

International Potato Center (CIP)

International Rice Research Institute (IRRI)

International Water Management Institute (IWMI)

John Innes Centre (JIC)

Management for Development Foundation (MDF)

New Mexico State University

North-West University

NOVUS International

Parco Tecnologico Padano

Stanford University

Stellenbosch University

Strathmore University Business School

Swedish University of Agricultural Sciences

Thailand Paneaus Molodon Shrimp Research Center

University of California

University of Louisville

University of Pretoria

University of the Free State

Wageningen University

World Agroforestry Centre (ICRAF)

WorldFish Center

Appendix B: Questionnaire and interview questions

AST Impact Study Questionnaire

Background

1. What is your name?

2. What was the name of your home institution at the time of your AST?

3. Select the country where that home institution is located:

Burkina Faso, Cameroon, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Liberia, Malawi, Mali, Mozambique, Nigeria, Rwanda, Senegal, Tanzania, Uganda, Zambia

4. Select the type of that home institution:

Research, Government, University, Commercial, Non-profit, College, Other

5. Are you still at that same institution?

Yes; No my new institution is in the same region; No, my new institution is in the same country; No, my new institution is in a different African country; No, my new institution is in a different non-African country

6. How long ago was your AST?

0-2 years ago, 3-4 years ago, 5-6 years ago, 7-8 years ago

7. What best describes your career stage at the time of your AST?

Post-Master's, Post-Doctoral

8. How long did your AST last?

0-3 months, 4-6 months, 7-9 months

9. What was the name of your AST host institution?

10. Select your host institution's regional type:

African, Non-African

AREAS OF INQUIRY

You will be asked for your reflections in four main areas. Please find these and a brief explanation for how we are using these terms.

Scientific Advancement/Innovation

Your scientific advancement and innovation describes everything from technical skills and scientific outputs such as protocols and products to your career advancement as a scientist including publications, promotions, awards and speaking invitations.

Personal Development

This includes growth and development of personal attributes such as confidence, independence and effective communication you may have experienced during and after your AST.

Partnership

This concerns collaboration and networking opportunities and your experience building and maintaining relationships to those encountered during your AST.

Capacity Building at Home

This is exploring how well you have been able to translate learning from ASTs into improvements at your home institution. For some this is the home institution during the AST and for others it a new home institution if they have moved since returning from their AST. Please speak to the institution that is most relevant for your capacity building efforts.

Expectations & Reality of your experience

11. Please fill out the table to help us understand

- your goals before the AST
- your preparation to meet these goals before you left (Did you actively prepare before you left to ensure you had the best chance of achieving the goals you laid out in each area?).
- How well these goals were realized through your AST?

12. After reflecting on your answers, please describe one or two examples of how your preparation for a achieving a goal (or lack of preparation) was linked to that goal's outcome.

Achievements/Successes

13. Have you achieved **Scientific Advancement/Innovation** successes as a direct result of your AST?

Select all that apply: Yes, publication; Yes, technology advance; Yes, new area of expertise; Yes, grant submitted; Yes, grant funded; Yes, new degree; Yes, new position; Yes, increased salary; Yes, promotion; Yes, speaking/training invitation; Yes, another fellowship or award; Yes, other (please specify); No

If yes, please describe the best example of a success or achievement in this area.

14. Have you achieved **Personal Development** successes as a direct result of your AST?

Select all that apply: Yes, increased confidence; Yes, increased supervisory skills; Yes, improved time

management; Yes, improved communication skills; Yes, improved networking skills; Yes, improved goal setting; Yes, improved resilience; Yes, other (please specify); No

If yes, please describe the best example of a success or achievement in this area.

15. Have you achieved **Partnership** successes as a direct result of your AST?

Select all that apply: Yes, scientific collaboration with host institution beyond the AST's end; Yes, currently ongoing scientific collaboration with host institution; Yes, publication with host institution beyond the AST's end; Yes, currently ongoing publication writing with host institution; Yes, grant writing with host institution beyond the AST's end; Yes, currently ongoing grant writing with host institution; Yes, maintained mentoring relationship with host institution; Yes, social/informal engagement with colleagues from host institution; Yes, other (please specify); No

If yes, please describe the best example of a success or achievement in this area.

16. Have you achieved success **Capacity Building at Home** as a direct result of your AST?

Select all that apply: Yes, new platform/technique or technology established at home institution; Yes, new skills taught to colleagues; Yes, new partnerships and collaborations for your colleagues; Yes, promotion to more influential position; Yes, improved management/leadership/supervision at home institution; Yes, established or improved mentoring networks at home institution; Yes, other (please specify); No

If yes, please describe the best example of a success or achievement in this area.

Challenges/obstacles

17. Have you faced **Scientific Advancement/Innovation** challenges or obstacles during or after your AST?

Select all that apply: Yes, lack of financial resources; Yes, lack of supplies; Yes, lack of equipment; Yes, prohibitive rules, regulations or laws; Yes, lack of support from home institution; Yes, other (please specify); No

If, yes please describe your most significant challenge or obstacle in this area.

18. Have you faced **Personal Development** challenges or obstacles as a direct result of your AST?

Select all that apply: Yes, resentment from colleagues and/or supervisors for time away from home institution; Yes, resentment from colleagues and/or supervisors for recognition through AST selection; Yes, too much increased responsibility; Yes, unrealistic expectations of colleagues and/or supervisors; Yes, other (please specify); No

If, yes please describe your most significant challenge or obstacle in this area.

19. Have you faced **Partnership** challenges or obstacles as a direct result of your AST?

Select all that apply: Yes, cultural differences and/or expectations between myself and the host institution; Yes, poor communication with host institution; Yes, lack of ongoing commitment from host institution; Yes, poor follow-through on agreements made during AST by the host institution; Yes, other (please specify); No

If, yes please describe your most significant challenge or obstacle in this area.

20. Have you faced challenges in **Capacity Building at Home** after your AST experience?

Select all that apply: Yes, lack of relevance for your new skills/techniques/ideas; Yes, lack of interest in your new skills/techniques/ideas; Yes, lack of financial resources; Yes, lack of facilities for your new skills/techniques/ideas; Yes, poor management; Yes, resistance to change; Yes, other (please specify); No

If, yes please describe your most significant challenge or obstacle in this area.

Change realized (enabling support) & Change not yet realized (needed support)

We are interested in the lasting change for you, your institution, your region and the whole agricultural sector due to your AST work. We also want to know what desired change you have been unable to bring about. Finally, please help us understand the support you received (or needed) to bring about the realized or desired change.

21. What kind of change has resulted from your AST experience in your science skills and knowledge of conventional as well as innovative scientific approaches?

Major change, Minor change, No change

If change has occurred, where did the most significant support you received to achieve this change come from?

Family or community, Home institution, Host institution, AWARD, Other, please specify, No support received

In one sentence, what did this source do to support you?

22. In one sentence, what is a change in your science skills and knowledge of conventional as well as innovative scientific approaches that you have not been able to bring about? What support do you need to bring about this change?

23. What kind of change has resulted from your AST experience in your networking, visibility and access to scientific resources?

Major change, Minor change, No change

If change has occurred, where did the most significant support you received to achieve this change come from?

Family or community, Home institution, Host institution, AWARD, Other, please specify, No support received

In one sentence, what did this source do to support you?

24. In one sentence, what is a change in your networking, visibility and access to scientific resources that you have not been able to bring about?

What support do you need to bring about this change?

25. What kind of change has resulted from your AST experience in your organization's networking, visibility and access to scientific resources?

Major change, Minor change, No change

If change has occurred, in one or two sentences, how was this achieved?

26. In one sentence, what is the most important change in your organization's networking, visibility and access to scientific resources still needed?

Serving the home institution's mandate and contributing to an enabling environment

27. Please describe your institution's mandate in 1 sentence.

28. Please indicate your institution's end-users.

Select all that apply: Farmers, Extension, Industry, Other scientists, Other (please specify)

29. Have the skills, knowledge or partnerships you developed during your AST improved your institutions service towards its mandate?

Select all that apply: Yes, I increased direct engagement with my institution's end-users; Yes, I developed a technology, product and/or methodology idea; Yes, I connected with a technology, product and/or methodology development partner; Yes, I connected with a technology, product and/or methodology dissemination partner; Yes, I trialed a technology, product and/or methodology; Yes, I released a technology, product and/or methodology; Yes, other (please specify); No

If yes, please explain how your AST contributed to the most significant improvement to your institution's service towards its mandate.

Have the skills, knowledge or partnerships you developed during your AST informed policy level decisions?

Select all that apply: Yes, a policy decision in my institution; Yes, a policy decision in my region; Yes, a policy decision in my country; Yes, an international policy decision; Yes, other (please specify); No

If yes, please explain the most significant contribution to a policy decision of your AST work.

Appendix C: AWARD's purpose road map

The purpose road map (PRM) is one of the tools used in the AWARD Fellowship's mentoring component. The PRM is designed to facilitate fellows intentionally mapping out their future. There are four components of the PRM:

1. **Purpose:** The overall intended contribution through career development.
2. **Research:** Knowledge generation and dissemination. Includes academic research (master's and PhD), publications, technology generation and dissemination, which is gender responsive.
3. **Skills:** Scientific and interpersonal skills necessary for career advancement.
4. **Career:** Path through different levels and jobs until the most opportune position is found to effectively deliver the intended development purpose.

Linkages between components

Both the research pillar (advancement in technical skills and knowledge qualifications — MSc research, PhD research; research techniques and methodologies) and skills feed into the central pillar of career advancement. Research progress plus scientific and interpersonal skills are all essential for career advancement. When pro-actively managed, the career development path should lead to the intended development purpose on top.

Step one: Writing the development purpose

What do you want to see changed in society as a result of your professional/entrepreneurial contribution?

Writing a development purpose includes defining:

- **WHAT:** what you would love to see yourself doing in the future
- **WHO:** target beneficiaries
- **WHY:** original contribution to development
- **HOW:** drawing on your skills, achievements and resources
- **WHERE:** location

Step two: Constructing a DEVELOPMENT pillar



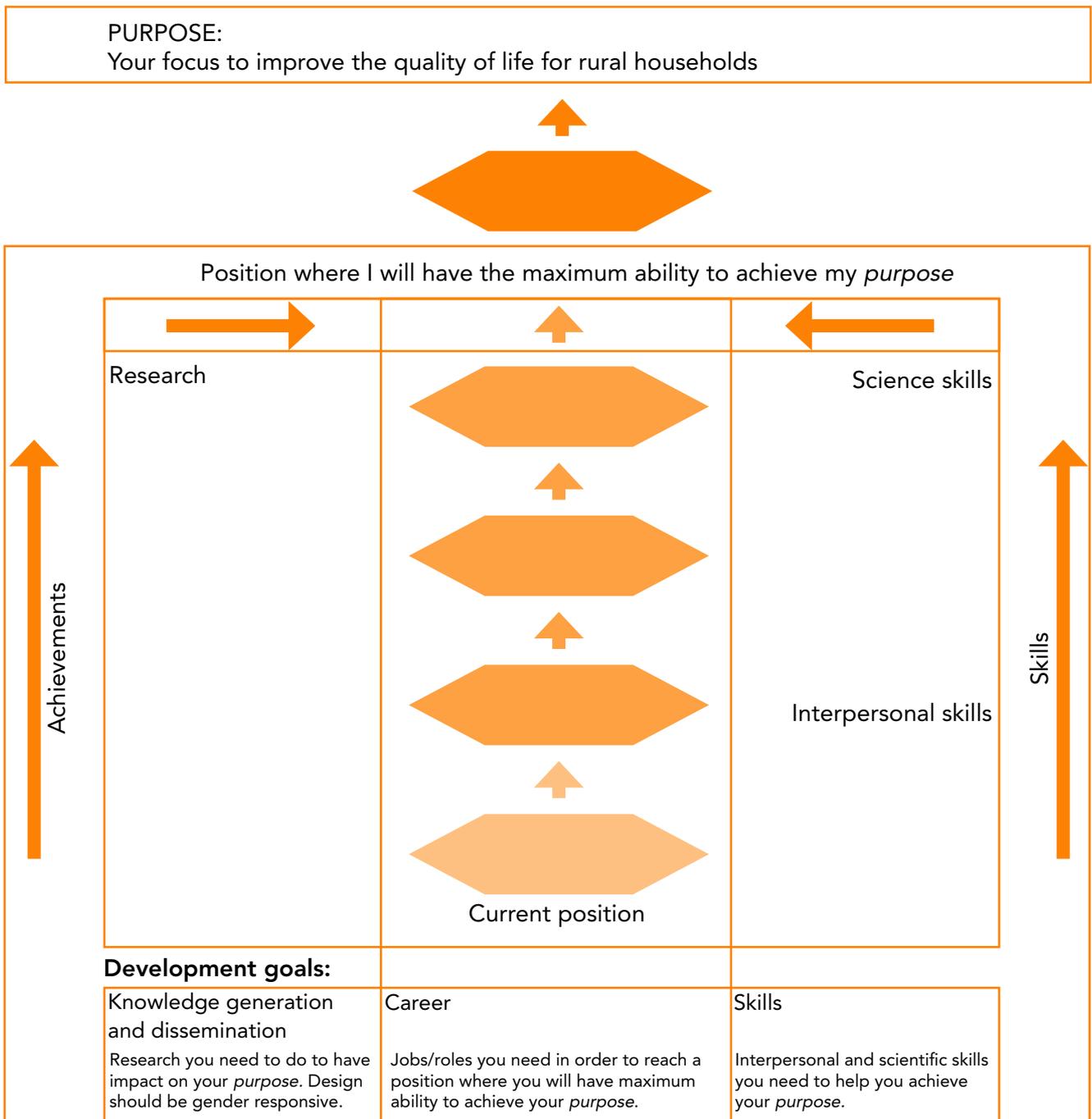
Step three: Constructing an ACHIEVEMENT pillar

- Academic and professional qualifications and recognitions
- Determining the relevant qualifications and recognition (e.g. knowledge and technology generation; entrepreneur of the year, best farmer, Top 40 under 40, etc.)

Step four: Constructing a SKILLS pillar

- Determining the required skills
- Make a list of all the technical and interpersonal skills you need in order to progress along your career/business path
- Identify priority skills that you should begin to develop first during the mentoring period
- Make a plan of action to develop the skills

Template



Appendix D: Selected scientific articles published in peer-reviewed journals post-AST (fellows indicated in bold)

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3. **Achandi EL** and **Mujawamariya G** (2016) Market participation by smallholder rice farmers in Tanzania: a double hurdle analysis. Studies in Agricultural Economics, 118(2):112-115
4. **Adekoya I**, Njobeh P, Obadina A, Chilaka C, **Okoth S**, De Boevre M and De Saeger S (2017) Awareness and prevalence of mycotoxin contamination in selected Nigerian fermented foods. Toxins, 9:363 DOI:10.3390/toxins9110363
5. Adeola AC, **Ommeh SC**, Murphy RW, Wu SF, Peng MS, Zhang YP (2015) Mitochondrial DNA variation of Nigerian domestic helmeted guinea fowl. Animal Genetics, 46(5):576-579
6. Adeola AC, **Ommeh SC**, Song JJ, Olaogun SC, Sanke OJ, Yin TT, et al. (2017) A cryptic mitochondrial DNA link between North European and West African dogs. Journal of Genetics and Genomics, 44(3):163-170
7. **Adeola OO** (2016) Women-Poverty-Productivity Nexus: A case study of women in riverine areas of Nigeria. Journal of Development and Agricultural Economics, 8(5):118-128
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9. **Asuming-Brempong S** (2014) Reverse transcriptase-quantitative polymerase chain reaction (RT-qPCR) and its usefulness in soil microbial ecological studies - A review. African Journal of Biotechnology, 13(6):723-728
10. Aura CM, Musa S, Osore MK, Kimani E, Alati VM, **Wambiji N**, Maina GW et al. (2017) Quantification of climate change implications for water-based management: A case study of oyster suitability sites occurrence model along the Kenya coast. Journal of Marine Systems, 165:27-35
11. **Babajide JM**, Maina S, Kiawa B and Skilton R (2015) Molecular identification of fungal isolates from steeped yam (gbodo): Predominance of *Meyerozyma guilliermondii*. Food Science and Biotechnology, 24(3): 1041-1047. DOI 10.1007/s10068-015-0133-9
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15. **Boonabaana B** (2014) Negotiating gender and tourism work: Women's lived experiences in Uganda. *Tourism and Hospitality Research*, 14:1-2
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Appendix E: Selected accounts of fellows from the survey

Additional partnership accounts:

'My host institute supervisor for my AST became my PhD supervisor and we have four publications that are under review from the research work.'

'My Host at the AST institution is one of my key collaborators in the new research that is being funded by the Bill and Melinda Gates Foundation.'

'I am still in constant communication with my two supervisors during the AST, they have become my mentors and friends. They alert me on different opportunities and always motivate me not to settle for less.'

'Mentoring relationship was a success which led to filming my activities in one of the communities I worked with through the film called "Women of change."'

'I still bask under my AST supervisor's networks. Four of my students have got scholarships and awards through these networks. I am hosting a student from University of Brussels at the moment and a project with University of Texas, among others.'

'I felt my AST supervisor was not open to me. Was hiding information from me and not giving me adequate guidance and time. In fact some of the techniques I learnt were out of my own initiative, going to the different labs, introducing myself and requesting if I could learn the techniques through the work they were doing!'

Additional personal development accounts:

'My supervisor always challenged me to think critically as a scientist. This has enabled me to conduct meaningful and productive advanced research while successfully networking with other scientists and livestock producers nationally and internationally.'

'I am now able to take up more challenging responsibilities with confidence.'

'Generally I am now more outgoing than before and am happy and excited with the outcome.'

'I work with great skill, zeal and time management. Presently I am nominated first for any coordination and supervisory roles when great achievement is needed. For example, I am the chairman of curriculum development and the Nigerian university accreditation committee and was once deputy director for human rights and gender education.'

'I am now more assertive as a result of my AST. I supervise the largest number of students in their research due to my increased confidence and supervisory skills.'

'One achievement that stood out for me is time management. I learnt to efficiently use my time for work and personal duties which made me very productive in my work.'

'All the skills that I learnt during my AST, for example communicating skills, research skills, improved writing and presentation skills, gender integration skills to mention a few, really help me discharge my duties with a touch of excellence.'

'In this age of paradigm shift in research approaches, my versatility to be able to swing between

both qualitative and quantitative research methodologies and software applications is a skill I have acquired that will not only stay with me for life but makes me a better scientist.'

'I am now able to articulate my points through the negotiation skills that I acquired.'

'I am able to talk more confidently even in meetings with senior staff.'

'My confidence in my research work and my communication skills improved after my AST. I was able to share my research work to the public by presenting the small scale production system at the National Agriculture fair of 2013 and produced extension material for distribution to farmers who were interested to adopt the technology.'

'I have managed to improve my public speaking skills, supervisory skills and confidence. I always see any challenge as an opportunity for me which was not the case before AST.'

'With increased resilience, I feel I am now confident to work in any part of the world.'

'My level of confidence has remarkably increased since my AST. Knowledge comes with confidence. I had always been nervous to defend a research proposal, especially when I know that someone will ask quantitative questions. With the level of statistical knowledge I have acquired now, I can confidently stand and proudly present a quantitative research proposal.'

'As a leader, I am confronted with daily challenges but these do not deter me but I stand firm with confidence and 'I can do' spirit. '

'After the AST, I felt confident enough to continue with my education. Pursuing studies outside one's home country takes a lot of effort and resilience especially as a wife and a mother of 2 children. However, I am confident and believe that I can make it in record time.'

'I learned to receive forgiveness from others for making mistakes. This taught me to be resilient and bounce back to normalcy.'

'The negative experiences and challenges I faced during my AST helped me to be resilient during my challenging PhD studies. This enabled me not to give up my PhD studies because I had to stretch far, cope with hard times, to be able to successfully complete.'

'I am much more confident in conducting modern biotechnology research as a direct result of working with seasoned scientists that I had only just read about before.'

'The presentations that I made during my AST left a profound mark on me because they were presentations I made to very different audiences. It was motivating that I could still deliver in such a diverse setting.'

'Due to the AST, I am more confident in my scientific communication, both written and oral communication. I love that I make a PowerPoint communication the way I want to, and get to see the audience appreciate both the content and manner of presentation.'

'I learnt to be independent and resilient in situations that can be very frustrating i.e. working and living among people whom you can hardly efficiently communicate with, yet you have to do it. It calls for special grace, resilience and confidence.'

'I am getting requests to take up more responsibilities. Although this is positive, I am weighing on which ones to shoulder and which ones to allow others to take up so that I do not overcrowd my time

and neglect research.'

'Some obstacles of trying to 'marry' the objectives of AWARD as it relates to my teaching field, mission of my institution and the challenge to share relevant aspect so as to carry them along has not been an easy task.'

'After my AST fellowship, I was allocated many classes to teach. This is because somebody thought while I was training for AST I went for leisure and therefore, I should be added more teaching load.'

'Being critical of issues around me was a challenge for my colleagues. Above all the environment is male dominated. So they tried their best to bypass me from any activities.'

Additional career acceleration accounts:

'I am very happy that from the AST, I have 2 manuscripts currently undergoing the initial stages of review! I am happy and my supervisors are ecstatic about the progress I am making with my work. Due to the fact that I now know what I am doing, I am relieving a lot of work from my supervisors which helps them get more done and pushes forward the vision of our research group even faster.'

'Since my AST I have developed on average 2 successful proposal per year. The last example is a research proposal developed with Manchester University which was funded by Economic and Social Research Fund in the United Kingdom.'

Additional capacity building accounts:

'Through the skills I learnt during my AST, I have been able to serve as mentor to motivate other younger colleagues at work. I advise the senior colleagues on different opportunities and ways they could enhance their capabilities.'

'I have shared my qualitative data analysis skills with my colleagues.'

'I have organized workshops on the new skills gained and have also mentored 2 colleagues and 4 junior scientists. I have also been able to influence mainstreaming gender into most of the institute's projects.'

'My colleagues have used the resource materials obtained from the AST in advancing their skills and knowledge.'

'I am now mentoring and supervising 4 master's students and one PhD student. I have been assigned team leader, coordinating one undergraduate and one master's class. My team members have become better organized and focused as a result of my change in personal character.'

'For the first time, a female student just graduated with a First class honors in my department since its establishment in 1982 through my mentoring activities.'

'As a result of my mentoring skills, my AWARD Fellow Mentee got 6-months training at Cornell University USA and she was able to have a good presentation during a conference in China.'

'Based on the knowledge and skills I acquired during my attachment, I am currently on a team with whom I am collaborating to develop a proposal for funding. I intend to teach the molecular skills to colleagues when the proposal is funded. This will enable me to establish the molecular technique for

mushroom identification and other protocols in my home institute.'

'I managed to change and improve leadership and supervision style at my home institution.'

'Upon my return from my AST, I gave a presentation to my colleagues at the Department of Fisheries on the small scale catfish production system and how it operates. As a result, a small scale catfish tank was constructed for catfish production trials at the national aquaculture research center.'

'We establish at home institution research capacity on Endocrine disrupting chemicals area.'

'Going for the AST raised my profile in my home institution as someone who is knowledgeable and can handle complicated tasks. From that I was tasked with developing protocols for the department for monitoring poultry hatcheries countrywide.'

'Newly learned skill from my host institution on carotenoid analysis was taught to a local institution that I am collaborating with in my project.'

'I developed new courses that will sell my university such as scientific research, writings and presentation and computational chemistry and Cheminformatics.'

'Instead of hiring a new teacher, my AST has empowered me to teach a new course.'

'Given the skills and knowledge I had obtained, the Institute was able to carry out a gender baseline survey for a project within the Ministry of Agriculture.'

'I have so far trained two farmer groups in doing agribusiness focusing on common bean farming enterprise. I am in the process of training the third group. One of the trained groups has already secured a contract for producing common bean seed.'

'Since 2016, I have served as the Chairperson for the National Animal Breeding Policy task force trusted to review the Malawi's Animal Breeding Policy that is a section of Malawi's Livestock Policy document. Malawi's Livestock Policy is led by the Department of Animal Health and Livestock Development of the Ministry of Agriculture, Irrigation and Water Development.'

'I had an opportunity to build capacity of Tanzanian government and research workers in conducting focus group discussions.'

'I am in the process of developing a policy brief on improving sweet potato yields in Kenya. I hope that this policy will be incorporated into national policies on agriculture.'

'I am advocating for inclusion and prioritizing of bio-fortification in national policy documents and strategy plans. I have succeeded with 2 strategy documents already and still working on other available ones.'

'The report I wrote on Evidence Based Exposure to Aflatoxin was adopted by PACA and this will inform the region on aflatoxin management.'

'I contributed to a publication on Practical issues for consideration in National Biodiversity Strategies and Action Plans to minimize the use of agrochemicals; a Technical guidance document.'

'As a livestock expert and an animal genetic resources AU-IBAR Southern African region consultant, I have contributed to the national, regional and international policy on Conservation, Management, Utilization and Promotion of indigenous livestock.'

'I founded my organization called Teams Advancing Women in Agriculture based on my AWARD goal of alleviating poverty through women empowerment especially in agriculture. I have managed to raise the profile of my organization and is now internationally known.'

'The biocontrol product for mitigating aflatoxins in maize, groundnuts and cotton was first developed in the USA. Through AST, I had the privilege of visiting the manufacturing facility and farmers who were using this biocontrol product. This has given IITA an idea as to how to commercialize the biocontrol product in Zambia as well as establish a manufacturing facility in the country.'

'We developed and released high yielding varieties with a participatory approach and technology packages to help farmers get high yields. We are also setting up a high throughput phenotyping method to help us develop varieties with good water use efficiency.'

'With the techniques established at the University we were able to contribute to extension in diagnosing contamination by endocrine disrupting chemicals and heavy metals.'

'I provided leadership training to Liberian farmers (mostly females) and conducted a study on the impacts of the Ebola Virus Disease, pointing out the unpreparedness of the agriculture sector in Liberia's unpreparedness for such a pandemic.'

'I headed a team that won Association of the Science of Limnology and Oceanography Global Outreach Initiative project grant where we will impart practical marine pollution monitoring skills to undergraduate students in Nigeria.'

'I have so many ideas and I really do want to make an impact in my institution but unfortunately the only way I see this happening is training and re-training which requires funds.'

'After the AST, I developed different ideas, and one of my main idea was mentoring my students when I start work, by equipping them with different skills that I learnt. For example, use of certain analysis packages. The university cannot provide these packages because they are expensive and I cannot afford them either, so I end up teaching theory only.'

'The Centre for Industrial Microbiology and Bioprocess Engineering that I established has experienced increasing demand yet the space and resources are diminishing. I have become more shrewd in negotiating with the clients to give us more support.'

Appendix F: Inspiration and advice from AWARD Fellows

- **Make the decision that is right for you**
- **Plan and take responsibility**
- **Be open and share**
- **Stand up to challenges**
- **Believe in yourself**

Make the decision that is right for you _____

'Produce your roadmap and pursue your dreams with focus.'

'One must assess their needs and make sure the course is filling an immediate need. Otherwise you might regret your choice and not be focused.'

'Plan and know exactly what you want to achieve. Figure out what is limiting you and figure out what skills you need to break that barrier. Make sure the place you go will provide you with those skills and experience. Pursue those skills then when you are there without wasting a lot of time complaining instead of making the best out of the opportunity.'

'Make sure you select the right opportunity. Take your time and do not just rush into any course or attachment, make sure it is going to help you. Think about how you are going to apply the knowledge you will gain before you go. Write down your objectives and make sure they clearly contribute to the goals of your road map. Make the most out of your time – focus and concentrate. Get skills that you can share to benefit the capacity of your institution.'

'Work with AWARD very closely before the AST to make sure there is a good match for your AST. For early career fellows the science attachments and courses might make sense but if you are further in your career it might be more beneficial to develop skills such as leadership and mentoring.'

Plan and take responsibility _____

'When you are planning to do that advanced attachment, see it as a long term partnership collaboration that you are establishing to go beyond that period. So what image or foundation do you want to build for yourself that you can come back to 10 years down the line? See far and look beyond that period.'

'Be open and plan and plan and plan. If you have planned very well then you will be able to deal with the unforeseen challenges that come up. Set realistic objectives for your attachment period and realize that things can take a lot longer than you thought. This is especially true when it comes to bench experiments. Plan to get the most out of the attachment experience. See the attachment as the beginning of a long term relationship with your hosts. There is an opportunity to create something that will grow for the rest of your life.'

'Plan your AST very well and be very clear on what you want to get out of the experience. Negotiate with your hosts and make sure the expectations are synchronized all before you arrive. There needs to be a clear commitment from the hosts and the relationship needs to begin before you make the trip. Make sure your host is willing to spend time on supporting you in developing skills in your weaker areas.'

'Before going on a placement, be sure you know what you want to do, focus on it, don't deviate, and get the best out of the opportunity. Develop a proposal that is clear. Don't give up even when you meet challenges. Seek assistance from others. Be yourself and be confident that you can achieve your goals.'

'Make the plan first, don't worry about the challenges you might face such as financing. Make the plan while you are still there so that you don't forget or lose your momentum.'

'Prepare yourself for the experience so you don't have to be walked through the basics and build a foundation for your work.'

'Know what you want to achieve before you go and develop a checklist for your goals. Learn as much as possible about the organization, the people, and the project you are going to work with before you go on your AST.'

'Don't just go blind into the experience. Plan. Think about what impact you will have on the society from your research.'

'Nurture a partnership by first establishing what each partner brings to the table and what the shared vision is for the project. Establish a system where each partner can contribute into the other's expertise space in the common agenda. This should be done through mutual respect and understanding and by establishing a partnership of equality and not hierarchy.'

'Be prepared to do independent work during a course. You should not expect to be fed all of the things you want to get out of the experience. Take responsibility for your own learning.'

'Be vigilant, don't rely on anyone else or you may not be making the most of your time. Identify the helpful people no matter who they are and do whatever you can to learn from them. Be quick in adapting to the situation and be active to make sure you get the help you need.'

'Document everything with blogs or in other ways. The rich experiences that you go through should be reflected down on paper so that you can take those experiences away with you forever.'

'Go into the opportunity with an open mind. Take instructions and let people help you so you can absorb all you can.'

'Own what you are doing. It is your responsibility to prepare.'

'Whether you go for long attachment or you go for a short course, there should be some aftermath.'
'For AST, avail yourself to learn. There is no age limit to learning. Not just mere learning – learning and also translating learning into benefits for others.'

Be open and share

'Make an effort to use the skills you acquire as soon as you can. Share the knowledge with your students and colleagues as much as you can.'

'Get to know people within the organization and socialize. Keep in touch with the supervisors and other colleagues after you get back home and continue to let them know what you are doing.'

'Be open about learning what people are doing around you because you never know where your next opportunity might come from.'

'Speak up when something is not meeting your expectations to make sure you are able to get the training you need.'

'Be open to learning and criticism and people will be more open to you.'

'Be opened-minded but be focused. Interact with the course instructors and make sure you keep in mind the objectives you set for yourself and do what is required to meet them. Be bold and ask for the help you need. Network.'

'Keep an open mind and ask questions when things are not the way you are used to at home. Put aside all you think you know and learn from your experience. No one is too small to learn from, even when they are junior to you.'

'Try and appreciate the culture of your hosts and work together with them as a team. Go there to succeed.'

'Always be ready and willing to present what you are doing to anyone who might be interested. Get involved in your host community.'

'Know the culture of the place you are going by looking on the internet and talking to people so you are ready. Be sensitive to the people who are around you. Hang on through the challenges and be patient with those you are working with in the host institution.'

'Make yourself the fool. If you start showing you know, you put off people and they will not be able to help you.'

'People become more open to you when you show you are open to learning. Also be open to criticism. It is good to accept your short falls because we learn in our weak points. I was able to say 'This is the first time I am handling it, can you please help me?''

'Do we really want to bring in change into our lives or are we just convinced what we do is the best? But I am really open to change because you know each time we learn. Each and every time you meet people you learn.'

'I value partnerships within the country first and foremost, and within Africa and beyond because then we can have things that we can exchange. There is so much to learn from each other and so by working together.'

'For AST, avail yourself to learn. There is no age limit to learning. Not just mere learning – learning and also translating learning into benefits for others.'

Stand up to challenges

'Manage your expectations going into the AST. Your experience may not go as smoothly as you expect. When challenges and disagreements come, be firm and diplomatic. Sometimes you have to go above your direct boss to make things happen. Be focused on your goal so that you don't give up when things get difficult. Meeting your goals will give you satisfaction and build confidence.'

'Take heart, wherever you go be determined. Don't think you will never meet challenges; challenges are all over. If you did something and failed, try a different method and maybe you will achieve it. Don't let the negative things take your heart away.'

'No matter the challenges, make sure you reap some benefits.'

'Be determined and focused. There might be cultural barriers but look beyond those and be prepared to overcome whatever shocks and challenges you might face.'

'Nothing comes on a silver platter, you have to work hard and be opened minded.'

'Be willing to go with the flow because there will be a lot of things that you cannot control.'

'The adversary is the most important person in the team because while they are opposing you they will also tell you what they would have done instead and you can pick that up.'

'Problems are always there in life but there is always a way.'

'There is within ourselves a part of us which can be able to do so much if we allow ourselves to. So I have learned to trust and have confidence that I can do so much and take up challenges.'

'So I think we don't need to stop. Whatever we can do, as little as it may seem, it still makes a change to somebody. As long as on the ground somebody is able to benefit or change or become a better person then we don't have to wait.'

'Speak up. The worse that can happen is someone killing you and no one is going to do that. If you have something then speak up and say it. Feel the fear but still go for it.'

Believe in yourself

'Know yourself and use that self-knowledge to identify your career path. It is believing in yourself and what you are doing that builds confidence and then slowly people will know who you are and what your contribution is into the whole science arena and then you get a lot of opportunities.'

'Be open to learning. There is so much to learn in every situation even if you think you have a lot of knowledge and experience already. Believe in yourself. Make sure you offer what is inside you.'

'I drew much more from myself than I thought I was worth.'

'Sometimes others will try and take away your power invisibly, or try to say some statements that reduce your spirit. To really be bold, know your stuff, back it up and just speak.'

'AWARD opened my eyes. Some of us try to just do things and we are gambling and fumbling around, but when you are able to write down what you want in the next 2 years, in the next 5 years, in the next 10 years it helps a lot.'

'I tell everybody I come across, the changes I can see in my life I attribute first to God and after God to AWARD and I am telling you the truth.'

'I am grateful for AWARD, it came at the right time to help us African women. It came at the right time when I was transiting into academics and I believe I needed that confidence. I needed that affirmation.'

'One of the best things that has happened to me is the AWARD Fellowship because it has built me up and it is still building me.'

'AWARD is a fellowship for life.'



African Women in Agricultural Research and Development (AWARD) works toward inclusive, agriculture-driven prosperity for the African continent by strengthening the production and dissemination of more gender-responsive agricultural research and innovation. We invest in African scientists, research institutions, and agribusinesses so that they can deliver agricultural innovations that better respond to the needs and priorities of a diversity of women and men across Africa's agricultural value chains.

Since 2008, AWARD has, through individually tailored two-year fellowships, worked to strengthen the research and leadership skills of African women in agricultural science, empowering them to contribute more effectively to alleviating poverty and increasing food security in sub-Saharan Africa.

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