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Moore Inventor Fellows

Final Evaluation Report

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Executive Summary

Background on Moore Inventor Fellows

The Gordon and Betty Moore Foundation began the Moore Inventor Fellows program in 2016 to support 50 early-career academic inventors who harness science and technology to invent solutions that enhance the conduct of scientific research, strengthen environmental conservation, or improve the experience and outcomes of patient care. The Moore Inventor Fellow program is built on the premise that focusing support on early-stage inventions that lead to proofs-of-concept or advance existing prototypes towards application will lead to tools and technologies that catalyze new opportunities and accelerate progress in the foundation's three main areas of interest. The program also seeks to stimulate an ecosystem of inventors at the critical intersection of research and pre-commercial development. During the three-year award period, fellows can use the funding to secure the time and resources to make progress on their inventions. They also have opportunities to learn entrepreneurial skills (notably through Activate, a nonprofit organization that partners with U.S.-based funders and research institutions to provide support in entrepreneurship to scientists), network with other fellows and funders, and gain visibility for their achievements.

Purpose of the evaluation

Mathematica conducted a retrospective evaluation of the first eight Moore Inventor Fellow cohorts. The process evaluation investigated the fellowship's design and implementation and solicited external insights about operational decisions. We also measured summative outcomes to assess whether, and to what extent, the fellowship was influencing individual inventors, their inventions, fields, and the invention ecosystem.

Methods

The evaluation was conducted in four months and used data from multiple sources: desk research (peer-reviewed and gray literature); interviews and focus groups with key informants (foundation staff and reviewers, fellows and finalists, and other funders and experts); and a survey of and review of program documentation from fellows and finalists. Overall, 24 out of 40 fellows and 13 of 40 finalists participated in interviews, focus groups, or the survey, but we have information about characteristics, research outputs, and patents for all 80 fellows and finalists. We used quasi-experimental approaches to compare fellows to finalists, and to compare earlier cohorts to later cohorts, if justified by the sample size. We also used retrospective pre-post comparisons of self-reported data to understand how fellows' and finalists' opinions and actions may have changed relative to their initial expectations.

Study limitations

- ***Quasi-experimental design***. This evaluation was designed nine years into the Moore Inventor Fellows implementation, at which point the best available design option was a retrospective, descriptive approach that mixed subjective and objective data sources and compared, to the extent possible, the experiences of fellows and finalists over time. Because little thought was given to outcomes measurement when the program was designed, it was not possible for the retrospective evaluation to control for threats to internal validity—including the myriad factors that affect individuals, inventions, fields, and ecosystems—to answer cause-and-effect questions about the program's impact at each of these levels. Nor was it possible to use statistical models to estimate the marginal effect of the program on selected outcomes of interest because of the small number of program and evaluation participants and the qualitative nature of most independent and outcome variables.
- ***Generalizability***. Outcomes based on surveys, interviews, and focus groups represent samples, rather than the universe, of fellows and finalists and may not represent all cohorts. The response to our survey was particularly low and imbalanced, which made it inappropriate to make fellow-finalist comparisons for some survey-based outcomes.
- ***COVID-19***. The pandemic affected implementation, as well as the feasibility, focus, and progress of research in many academic fields. Cohorts before and after 2020 had different experiences with the program, limiting the evaluations' ability to draw conclusions about the processes and outcomes related to these aspects of the program.
- ***Measurement***. This evaluation would have been more comprehensive and robust if we had better measures of scientific output, field and ecosystem outcomes, and long-term outcomes. Such measures were not possible to collect during this evaluation due to its timing and data sources.
- ***Recall and attribution bias***. Some fellows and finalists found it difficult to recall career timelines and events, or to identify the extent to which outcomes were related to different sources of funding. This may be most pronounced for the earliest cohorts and affected finalists more than fellows.
- *Attrition.* Personnel changes among foundation staff, external reviewers and advisory panel members, and at Activate limited the insights that the evaluation team could collect through interviews and, possibly, program documentation.
- ***Social desirability bias***. Fellows and finalists may have been motivated to overstate their achievements or understate challenges, especially in focus groups.

Findings

Program Approach

- Moore Inventor Fellows focuses on early-career academics with early-stage inventions, who continue to be important but under-supported contributors to the ecosystem.

- Although the foundation articulated general aims and monitoring strategies for the fellowship, it did not specify discrete, measurable outcomes or intentional evaluation plans to understand impacts at the individual and ecosystem levels.
- Based on the as-implemented theory of change that Mathematica developed during this evaluation, the fellowship's hypothesized short-term outcomes on individual fellows and their inventions are clearly and directly connected to funding networking, training, and publicity. However, the hypothesized pathways and likelihoods of impact on individuals and inventions after the end of the grant are more variable, and the program's potential to impact fields and ecosystems is limited by its modest size.

Program Deployment

- The selection process successfully identified high-quality finalists and fellows. However, although the fellowship encourages diverse applicants and expanded the list of eligible institutions over time, fellows and finalists largely come from a small group of highly resourced institutions.
- The Moore Inventor Fellows' flexible funding gave fellows space to focus on their inventions and allowed them to hire stronger teams, and the publicity and prestige aided their careers and ability to secure additional funding. However, program supports for entrepreneurial training and network building were limited by time and resource constraints.
- Program staff monitored the progress of individual fellows against the expectations defined at award, but staffing constraints affected cross-program alignment and continuity, and there was no systematic measurement of the program's outcomes or impacts before this year.

Program Results

Inventors and their inventions

- The Moore Inventor Fellows program allowed fellows to pursue high-risk ideas, follow the science, and pivot when necessary; finalists had to align their work to follow the funding.
- Compared to the finalists, fellows made more progress in the three years after selection, increased their confidence, and improved their networks.
- Both fellows and finalists are securing additional funding – but the Moore Inventor Fellows award makes it easier for fellows.
- Fellows as a group have slightly more publications and patents than finalists and are cited more often, but finalists lead in these counts within some of the later cohorts, and these differences between fellows and finalists often existed before fellowship selection.
- Both fellows and finalists are advancing in their careers and largely remain in academic settings.

- Both fellows and finalists are achieving key scientific and business milestones, but there is insufficient data to determine which group does so more often or more quickly.

Fields and the invention ecosystem

- Fellows are developing the next generation of inventors and entrepreneurs more than finalists.
- Both fellows and finalists are getting visibility and recognition that demonstrates the potential of invention and translational research in academic settings.
- It's unclear whether the fellowship plays a role in strengthening the invention ecosystem in academic settings, and we did not find evidence that the Moore Inventor Fellows program is encouraging investments by other funders.

Conclusions

Moore Inventor Fellows fills a persistent gap by supporting academic inventors and their early-stage inventions. However, the foundation did not establish clear expectations for measuring and evaluating impact, and the program has a limited ability to influence fields and the invention ecosystem given its size. The selection process is successful in identifying high-quality candidates, but these individuals mostly come from well-resourced academic institutions, and the program does not take tangible steps to promote diversity among inventors. The program offers fellows the kinds of financial and non-financial supports they need, but some aspects of program implementation were hampered by COVID-19 and staff turnover within and outside of the foundation.

We are unable to draw causal or definitive claims about impacts on fellows due to the sample size constraints. However, the data we have suggests that the award's flexibility allowed fellows to follow the science, pursue risky ideas, and lean into the creative and iterative process of invention. Relative to finalists, fellows are more confident, have stronger networks, make more progress, and pivot more frequently. Fellows are also doing more than finalists to expand the inventor workforce by having larger teams, including individuals who have the potential to become part of the next generation of inventors and entrepreneurs. Although fellows have more research and patent outputs than finalists (as a group and in earlier cohorts), finalists outpace fellows in later cohorts, and these differences were often present prior to Moore Inventor Fellows selection. Both fellows and finalists are securing additional funding, developing proofs of concept or functional prototypes, commercializing their inventions, and receiving recognition for their work. Both groups are also on the path towards achieving their long-term outcomes and are improving the credibility of careers in academic invention and entrepreneurialism, but there is not enough data to know whether fellows will achieve these outcomes or influence more quickly or more often than finalists.

If the foundation decides to continue the Moore Inventor Fellows program, it has an opportunity to improve the program's design and implementation to strengthen its ability to measure and achieve impacts at multiple levels.