

## **Board 334: Master's Individual Development Plans as an Essential Tool in Workforce Development**

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## Master's Individual Development Plans as an Essential Tool in Workforce Development

### *Abstract:*

*The recent National Academies of Sciences, Engineering and Medicine Report on Graduate STEM Education for the 21st Century recommends two broad and especially compelling career-related actions for STEM master's degree programs: (1) the creation of Individual Development Plans (IDPs) and (2) the provision of Career Exploration opportunities. However, while IDPs have become more prevalent in PhD and Postdoctoral programs, they are not at all common in engineering and science master's programs. In this poster/short paper, we will present information about the initial IDP templates that have been developed as part of an NSF Workshop grant and discuss its use in engineering master's programs.*

Individual Development Plans (IDPs) are tools used in industry and education to help employees define and pursue their career and professional goals and have become more prevalent in science PhD and Postdoctoral programs. However, IDPs are not as common in master's programs. The STEM (Science, Technology, Engineering and Mathematics) IDP templates available online are targeted towards doctoral degrees and research careers. While many of these IDPs do have professionally oriented sections, they are not relevant for more professionally oriented STEM master's students mainly because of the heavy emphasis on research and research related activities. While IDPs or professional Development Plans have been advanced for some fields with destination master's (M.S.-type) degrees (such as the arts or public health), these are very specific and not easily transferred to STEM master's degrees. The short time frames to completion and the intensifying workforce development aspects of STEM master's degrees present distinctive conditions that mandate the need for research into their use and the creation of specialized IDPs for students in these programs.

In all master's programs, including the proliferating "professional" STEM master's degrees and other nontraditional programs like MOOC (massive open online course) master's degrees, there is a need for students to assume control of their personalized educational journeys from program selection to becoming lifelong learners. Acquisition of transferable professional skills and exploration of careers through experiential learning are widely promoted among many master's (and undergraduate) programs as desirable features of IDPs. In practice, transferable skills have sector specific definitions and delivery of training is variable in quality and modes. Experiential learning has a wide range of manifestations from individual internships/apprenticeships at companies, capstone projects which are common in engineering, and group industrial projects that may be done at the university. Inclusion of transferable skills acquisition and career exploration in a student's educational planning requires awareness and knowledge.

The importance of these topics has been reinforced in the recent National Academies of Sciences, Engineering and Medicine report on Graduate STEM Education for the 21st Century [1]. The report recommends two broad and especially compelling career-related actions for STEM master's degree programs: (1) the creation of Individual Development Plans (IDPs) and (2) the provision of Career Exploration opportunities. Recommendation 4.1 Core Competencies includes:

“Graduate students should create an individual development plan that includes the core competencies, as outlined in this report for master’s degrees, as a key feature of their own learning and career goals and that utilizes the resources provided by their university and relevant professional societies.” Recommendation 4.2 Career Exploration [1] states: “Institutions should integrate professional development opportunities, including relevant course offerings and internships, into curriculum design.” and “Industry, nonprofit, government and other employers should provide guidance and financial support for relevant course offerings at institutions and provide internships and other forms of professional experiences to students and recent graduates.”

An alignment framework for master’s degree programs produced by the Council of Graduate Schools [2] informed the National Academies of Science, Engineering and Medicine (NASEM) recommendations and provides a roadmap for content of an IDP. The four recommended elements are: disciplinary and interdisciplinary knowledge; professional competencies; foundational and transferable skills; and research. Further need for an IDP can be found by a recent survey in Nature on graduate programs, which found that only 1/3 of graduate students were satisfied with the career-pathway guidance and advice that they received [3]. And while almost all engineering undergraduate programs include courses in “professionalism”, many master’s programs do not.

The project “STEM Master’s IDP as an Essential Tool in Workforce Development” was funded by the NSF (Award Abstract #1940221 and #193934, 2020-2022). There were two parts of the NSF grants. In the first part, there was a survey conducted about the use of IDPs in master’s programs (see summary below). Following the survey, a workshop was held in Tampa, Florida, November 10, 2021, in conjunction with the National Professional Science Master’s Association Annual Conference.

The NSF funded survey was undertaken by the Council of Graduate Schools to collect data about the status of IDP use in STEM master’s programs. There were 151 responses, representing 80 unique institutions. Themes for the questions were: Mentoring and Advising Practices; Experiential Learning Opportunities; Transferable Skills; Template IDP Features; and Impact of COVID-19. A full discussion of the survey can be found in [4].

The body of knowledge created by the survey was designed to inform on whether there exists a need for a STEM Master of Science IDP. Of those programs that do not currently use any IDP like tools, 84% say they would use a master’s IDP template if one were available. This metric alone provides compelling support for the development. It was found that this type of specialized IDP would be useful in keeping the student moving forward in a self-directed assessment of program progress, as a record of professional development, and as preparation for resume-writing. The kind of action items and mechanisms for tracking progress implicit in an IDP will allow students to have more control over their career paths and aid their advisor/ mentor during program reviews. We suggest that having a master’s IDP template that includes more student ownership of educational and career decisions has the potential to promote positive action, reduce anxiety under all circumstances, and help in providing equitable access and inclusion to STEM academic fields.

The results of the survey were discussed at a workshop held in November 2021 and a preliminary IDP for STEM master’s programs was created. The workshop agenda can be viewed here [5]. The initial IDP created, named *msIDP*, includes the following: (a) a review of previous work

experience and its relevance to future careers; (b) the identification of skills and competencies; (c) techniques to self-assess skills and knowledge, set goals, and self-evaluate; (d) creation of a timeline for degree completion; (e) an understanding of the graduation requirements; (f) a way to keep track of experiential learning; (g) a method to collect information for a resume; and (h) tips for development of a professional network. The template IDP is available at [msIDP.org](http://msIDP.org). This is a continuing project and further research is ongoing.

#### Summary:

A master's Individual Development Plan encourages students to organize their studies well in advance and empowers them to create personalized educational pathways, a habit that will serve them well in graduate education and in becoming intentional lifelong learners. The IDP template, msIDP, will not only empower students to become more active partners in their educations, but will also prompt much needed discussions in programs, departments, and colleges about those practices that result in delivery of a better master's level education. Finally, experience with an IDP acclimates the students to personal development plans/assessments widely used in the workplace and to the necessity of ongoing planning and awareness for continuous professional development.

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