Forcing Quality and Sustainability in Gender and Diversity

K. Scheibl[1]
Research and Teaching Assistant
Gender Studies in Science and Engineering, Technische Universität München
Munich, Germany
E-Mail: katharina.scheibl@tum.de

S. Ihsen
Full Professor
Gender Studies in Science and Engineering, Technische Universität München
Munich, Germany
E-Mail: ihsen@tum.de

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INTRODUCTION

In public debates the question comes up more often how effective and sustainable gender initiatives in STEM sector are [1]. Due to shortage of skilled workers especially in technical professions, demographic change, growing interest in 'mixed teams' and not at least the challenge of equal opportunities for women and men, more and more universities have taken measures promoting women in STEM professions [2]. A lot of resources and actors from many different areas are involved in planning and implementing projects and policies. However, most of these measures are terminated after the project funding.

Because a lot of project managers (and universities as well) want to know more about the efficiency of their activities, but do not know how to integrate quality control into their daily work, TUM Gender Studies in Science and Engineering developed a one day training concept[2] to prepare together with the actors of equality measures efficacy and sustainability analysis in STEM motivation projects. The concept was tested and evaluated with 15 partners from 9 universities in Bavaria in summer 2014. In this paper, we present the seminar concept and the methodical toolbox that had been prepared together with the participants improving the continuous development of activities in the different organizations [3].

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[1] Corresponding Author
K. Scheibl
katharina.scheibl@tum.de

[2] The seminar was financed by the Bayerisches Staatsministerium für Bildung und Kultus, Wissenschaft und Kunst (Bavarian State Ministry of Education, Science and Arts). The concept was mainly developed by Dr. Wolfram Schneider, former research assistant at TUM Gender Studies.

1 EFFECTIVITY AND SUSTAINABILITY IN STEM

1.1 Definition

Effectiveness and sustainability analysis focuses on the assessment and appraisal of the divergence between the desired and the actual quality of gender activities. Evaluation is based on a systematic, data-supported judgement of conditions, processes and effects of any professional practice [4]. The primary objective of evaluation is the continuous audit and optimization of actions on all project stages from the very beginning to the end (see Fig. 1). For example, structural conditions in STEM must be critically questioned in terms of equality between women and men before setting adequate goals and taking concrete measures [5].

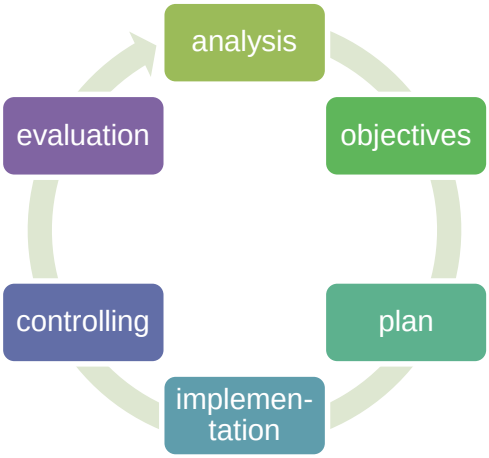

Fig. 1. Evaluation cycle for quality development (Pimminger 2014: 51)

The definition of objectives is essential within the scope of quality assurance and development [6]. It clarifies the objectives of evaluation and specifies the way of implementation of the new knowledge in the process of continuous improvement. The formulation of objectives comply with certain criteria, e. g. the SMART criteria, to provide indicators for aim-leading actions and their later control [7]. Thereby, the acronym ‘SMART’ stands for specific, measurable, attractive, realistic and terminated goals.

The documentation of the results can be used for legitimization and examination of own work as well as the equalization aims linked with it. Despite all the variability of the definition in detail, evaluation is a powerful instrument generating empiric knowledge for targeted decision making [8]. It enables qualifying and quantifying the benefits of gender activities. Thereby, successful gender initiatives can be followed up and improvements can be initiated.

1.2 Functions and Objectives

Effectiveness and sustainability analysis reinforce the binding character of measures, because quality becomes measurable and demandable. They allow to address target groups more appropriate and to support the visibility, networking and usability of professional know-how as well the social commitment on all levels.

However, planning and implementation of efficiency and sustainability analysis are not only essential for the quality assessment. They support the learning process as well as they maintain qualitative advancement of measures by the systematically linking and integrating of the experiences gained. By means of accompanying appraisals, first experiences can be drawn and improvements can be initiated during the project period itself.

In general, actors are not only interested in the results of evaluation but also in the entire process of implementation. Evaluation provides the opportunity to grasp and value processes and effects of a program. For example, evaluation allows:

- assessment of implemented measures,
- reflecting of actions,
- legitimation of the project,
- revealing strengths,
- optimization of processes,
- assessment of the economic profitability,
- improved transparency and
- compiling a systematic data basis for the planning, development, decision and inquiry of the financing need.

The planning, implementation and evaluation of effectiveness and sustainability analyses are connected with additional expenditure and indicates 'you allow someone else to look over your shoulder' [9]. Nevertheless, these investments are worthwhile for actors, because they offer the possibility of reflecting measures. In addition, the evaluation benefits not only the current project work but can also prepare the next project activities [10]. Last but not least, results can be used for the final assessment of a measure and the production by presentations, project reports and information.

2 WORKSHOP CONCEPT AND TARGET GROUP

The seminar was intended for heterogeneous actors of STEM motivation projects in schools and universities [3]. The aim of the one-day seminar was to provide the 15 partners applied methodical knowledge for carrying out analysis of effectiveness and sustainability as well as gender competence. The seminar focused the following contents:

- the identification of meaningful measuring indicators,
- the gender-differentiated inquiry and evaluation of data,
- the interpretation of results and, finally
- an assessment of the quantitative and qualitative offer and measures effects concerning the aims linked with it.

During the workshop, the systematization of gender activities had been demonstrated to the participants improving internal and external transparency and access. In this way, on the one hand offerings with the same orientation and similar contents should be identified and matched if possible (making more efficiently use of capacity and professional know-how), on the other hand existing gaps of gender activities should be detected and innovative project ideas should be discussed.

Moreover, questions of internal and external patterns are reflected during the implementation of the program. Fig. 2 provides a short overview of the taught knowledge and competences within the seminar:

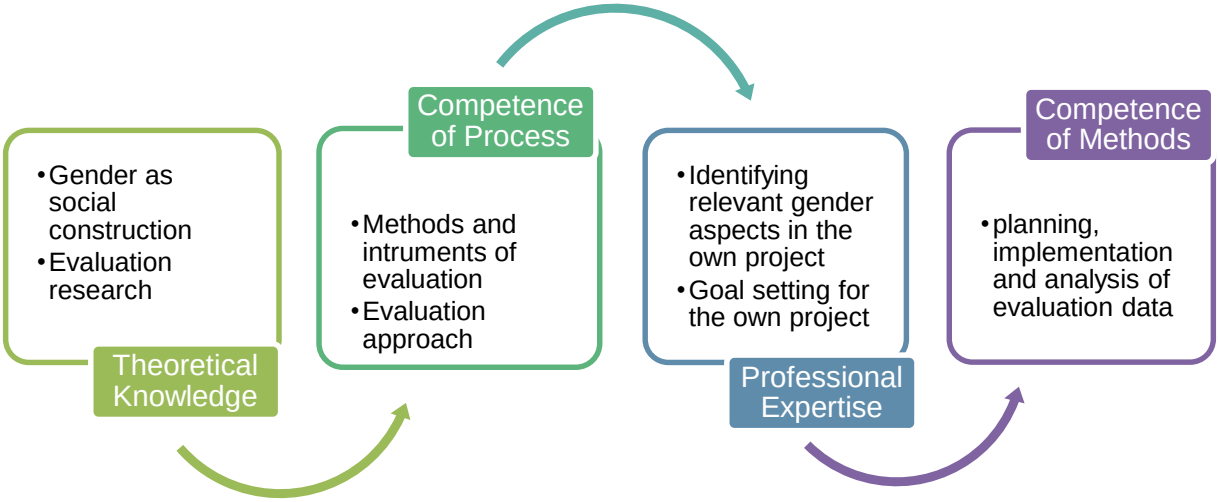

Fig. 2. Proceeding of the seminar

As Fig. 2 shows, participants of the seminar acquire theoretical knowledge, competence of process, professional expertise and competence of methods which enable them to plan, perform and analyze own evaluations.

The intensive mutual exchange of knowledge during the seminar also supported the development of a methodical toolbox evaluating gender projects. Participants had been encouraged to apply their new skills and develop solutions for their own project during the seminar. The seminar concept and the toolbox are scientifically monitoring.

3 RESULTS: APPROACH AND METHODICAL INSTRUMENTS

For evaluation three very well-known approaches could be used: the 'SWOT-Analysis', the 'PDCA-Model' and the 'Evaluation Cycle for internal Quality Development'.

3.1. SWOT-Analysis

A SWOT analysis is a structured planning method used to evaluate the **s**trengths, **w**eaknesses, **o**pportunities and **t**hreats involved in a project venture in order to identify internal or external factors which are favorable or unfavorable reaching pre-defined goals.

In general, SWOT-analysis combines an external with an internal assessment. The external analysis investigates factors beyond an examined organization or project (environmental analysis) [11].

In an internal analysis (organization analysis), however, strengths and weaknesses refer to the own organization or project [11]. From the combination of these both analysis levels a total of four connecting possibilities arise to maximize opportunities and strengths and to minimize threats and weaknesses as figure 3 shows [11].

SWOT		Internal Analysis	
		Strenghts	**Weaknesses**
External Analysis	**Opportunities**	Matching Strategy: How do you use strengths to take advantages of opportunities?	Transformation Strategy: How do you overcome the weaknesses that prevent you taking advantage of oppertunities?
	Threats	Neutralization Strategy: How do you use strengths to reduce the likelihood and impact of threats?	Defense Strategy: How do you address weaknesses that will make threats a reality?

Fig. 3 Quality management by the SWOT-analysis

3.2 PDCA-MODEL

The PDCA model is widespread in the quality development and assurance, but it is also used in continuous improvement and optimization processes [12]. The PDCA model represents a process cycle of four stages: starting with '**p**lan', goes to '**d**o', followed by '**c**heck' and ending with '**a**ct' (see Fig. 4).

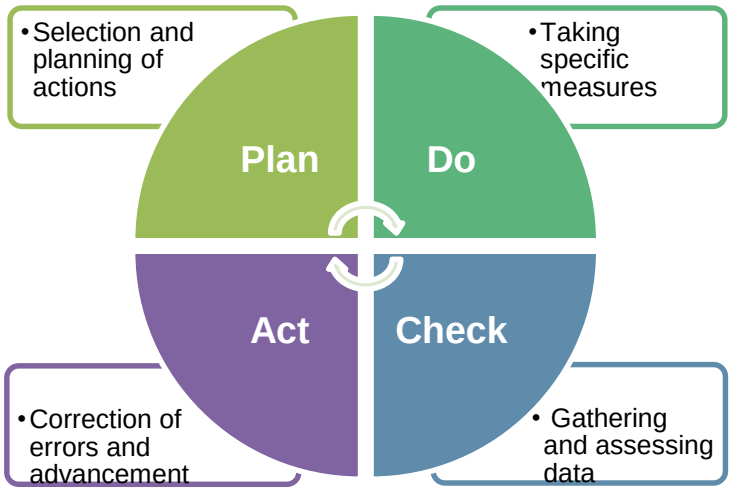

Fig. 4. Quality management by the PDCA-Model

- **P**lan: An existing problem is described and associated information is collected. The current situation is analyzed, appropriated objectives formulated and then measurements for problem solving are fixed.
- **D**o: The determined measurements are carried out and documented adhering the timeline and project budget.
- **C**heck: When the results are analyzed, presented and observed, they are compared with the original objectives. Next, successfully realized small measurements can be transferred and implemented in a larger context.
- **A**ct: Upon the successful implementation of activities, standardization and planning follow-up activities are done. The process is reflected and successful results are set as standard.

3.3 Evaluation Cycle of Internal Quality Development

As an internal evaluation process, which makes it possible to initiate changes and to check the effectiveness and sustainability of projects, the Bavarian state institute of school quality and educational research has sketched a circulation with seven procedure steps which has often been proven in practice (see Fig. 5).

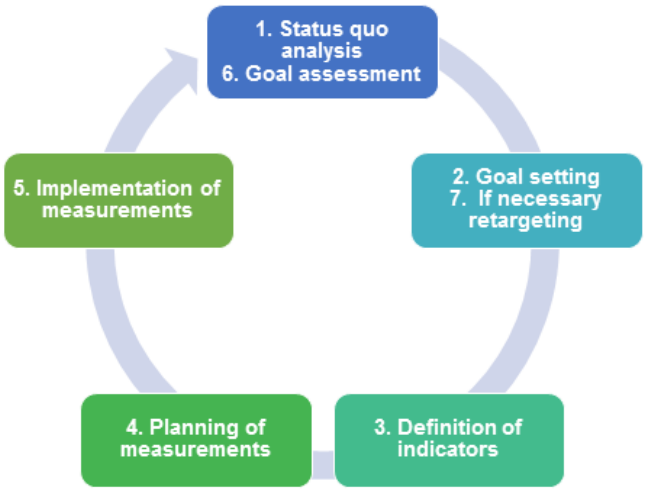

Fig. 5. Quality management by the evaluation cycle for quality development

The analysis starts with an inventory (step 1) to see what the organizational strengths and weaknesses of a project could be. The data collection in this process can be done by qualitative or quantitative questionnaires, secondary analyses and by monitoring material. As a result objectives in a hierarchical structure are defined (step 2). In this context, special care is to be taken on the goal clarification and setting: Only if it is exactly specified, what should be reached by a measure systematical progress is possible.

Subsequently, indicators for quality control will be defined (step 3) and project measures are planned (step 4). The single procedural steps are to be fixed in temporal order and competences are to be defined (e. g. milestones). The more specifically and more carefully this planning is done from the start, the better results are expected by the implementation of measures (step 5) afterwards. Special attention by the implementation of measures has to be taken to the fact that enough time is used for the conversion of the single steps. For quality control the project goals from step 1 have to be compared with the real project results from the end of step 5 (step 6) and for the next project circle possibly the goals will be adapted (step 7) [13].

4 CONCLUSIONS AND FURTHER WORK

As this article demonstrates, several methods and instruments are available for effectiveness and sustainability analysis in gender projects and measures in STEM. The results of the training concept show, quality management workshops achieves positive effects. Especially the concept of activating and integrating practical knowledge seems to be convenient for workshop participants in order to impart how to carrying out quality analysis independently. Additionally, the interaction between members from different institutions has been improved. However, it takes time for all parties to become acquainted with the requirements of the gender toolbox: for the project managers to change their approach or concept of researching and for institutions to get used to these changes. Potential transferability of the results to other projects and measures should be tested in further.

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