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Review Article

Introducing a Concept for Supporting Academically Gifted Students -the Osthushenrich- Center for Giftedness Research (OZHB)

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Abstract

Oftentimes, the promotion of scientifically gifted students in regular schools can constitute a great challenge for educators, the school system, as well as students themselves. The article introduces the Osthushenrich-Center for Giftedness Research (Osthushenrich-Zentrum für Hochbegabungsforschung an der Fakultät für Biologie, OZHB) at Bielefeld University, Germany (Head: Prof. Dr. Claas Wegner). The center aims at identifying, promoting, and helping scientifically gifted students in the region to further nurture their talents. Through its three-part structure (research, counselling, and practice), existing approaches to the identification and education of gifted students are constantly evaluated and revised. The article will give an insight into the theoretical basis of the center as well as its structure and practical projects which are not only concerned with promoting scientifically gifted students but also offer training courses for educators to improve school practice.

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Introduction

Before going into more detail about theoretical underpinnings of the center, it has to be noted that "the concept "gifted" lacks unity and identity in its referents and meanings, which makes intelligible and intelligent discourse on the nature of giftedness difficult" (Dai, 2009, p. 40) see also for inherent tensions of the concept). In the context of this article, the following definition based on the work of the International Panel of Experts for Gifted Education (IPEGE) is taken as a basis when the term "gifted" is mentioned:

The concept of giftedness is regarded as complex with individual profiles of giftedness which are shaped in constant interaction of the individual with its environment. Giftedness means the individual level of performance related potentials. Performance-related potentials are regarded as those prerequisites which enable individuals to act in a meaning-oriented and responsible way as well as engage in activities which are regarded as valuable and demanding in a certain culture through long-term, systematic stimulation and promotion. Oftentimes, gifted individuals have a higher performance capability and promotion potential when looking at comparison groups (Friedl et al. 2009). Bar-On and Maree (2009) mention an inherent issue when it comes to giftedness:

> *Although the gifted represent an enormous asset to society, most countries neglect this very important segment of the population and their potential contribution, relegating it to a poorly tapped national resource.*

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However, the belief in the importance of special (educational) measures to promote highly gifted students has gained increasing ground in Germany over the past decades (see also Heller, 2013, p. 66, for a historical overview specifically for Germany). Making education accessible for everybody, including gifted students, is of "key importance" (Secretariat of the Standing Conference of the Ministers of Education and Cultural Affairs of the Länder in the Federal Republic of Germany, 2017, p. 244) in educational legislation in Germany, as it mentions "Individual support in heterogeneous learning groups including inclusion and support of gifted students" (ibid.).
When it comes to giftedness education, the following questions should be considered:

- Why should the highly gifted be promoted?
- What should be promoted - special knowledge and domain-specific competencies, or the development of general thinking skills?
- How and where are the promotional measures to be conducted? (Heller, 2013, p. 64)

A basic right granted for every citizen is "optimal developmental opportunities" (ibid.) which also includes gifted children. What exactly should be promoted essentially depends on individual learning needs which include academic acceleration and remedial learning (ibid.). The question of how and where is strongly connected to the "differentiation problem, and to the formation of learning groups" (ibid.). Learning groups, especially within the German educational context, are thought to provide at least some effectiveness to instruction as students are grouped based on abilities (ibid.).

Starting school at the age of six (in Germany) might create homogeneity in terms of age, this however does not automatically lead to homogeneity in terms of the students' individual development. Since individual learning paces differ so much within the classroom, differentiation is absolutely necessary. Teachers are expected to foster the skills of each individual child by taking into account factors such as predispositions, motivation, interests, and prior knowledge.

Oftentimes, highly gifted students are overlooked in the classroom: they never attract any attention and their intellectual giftedness might never be discovered throughout their school careers. Friedl et al. (2009) stress the need to take into account students' individual developments when planning lessons which involve and address the needs of every student, including gifted ones. This can be put into practice by incorporating highly individualized approaches to learning and teaching, such as working with a portfolio or differentiated learning objectives in open settings. This is turn means high demands on the part of the teachers to adequately serve the needs of every student in the classroom. According to Friedl et al. (2009, pp. 31-32) teachers should have/develop the following abilities:

- Recognize/ identify giftedness
- Implement internal differentiation
- Design learning environments which enable challenging learning
- Planning and conducting lessons in which the individual learner is the starting point
- Building self-directed learning competences
- Assess individually
- engage in continuous education and training
- creating a learning atmosphere in which high performance is valued

Giftedness programs in turn can provide an adequate addition to the regular classroom as "it does not seem that we are yet in a place where differentiation within the regular classroom is a particularly effective method to challenge our most able learners" (Hertberg-Davis, 2009, p. 252).

The Osthushenrich-Center for Giftedness Research (OZHB) at the Department of Biology at Bielefeld University, Germany

Because of the importance of programs for fostering giftedness outside the classroom, issues of inclusion and social/cultural participation, as well as educational legislation in Germany, a giftedness program was conceptualized and initiated at Bielefeld University, Germany with the help of the Osthushenrich foundation . The center has its focus on promoting the abilities of highly gifted students as well as supporting teenagers with the transition from school to work. Giftedness promotion is centered around the so-called MINT (mathematics, informatics, natural sciences, and technology) subjects. Within the MINT sector, specially trained workforce is much needed – in the state of North Rhine Westphalia alone, more than 90.000 positions in the MINT sector are vacant (see also Hausamann,

2012). Particularly, the importance of fostering gifted students' interest in biology is stressed, as the subject can be seen as an interdisciplinary basis for science and research.

The center is composed of three essential parts which all serve certain functions (see Figure 1).

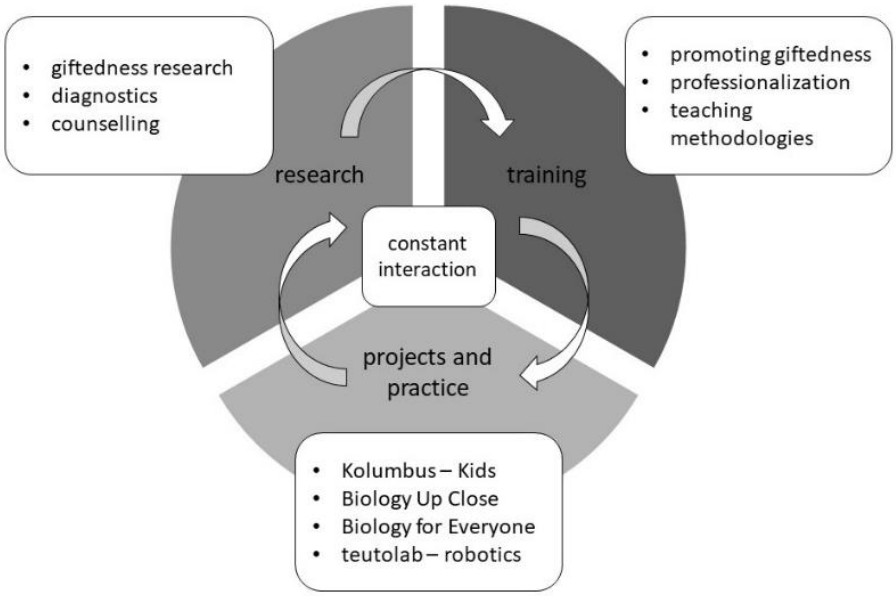

Figure 1.

Three-part Structure of the OZHB

The research sector provides the theoretical basis for the other two parts of the center. Within the training sector, consultation and professionalization processes are facilitated. Projects are carried out to practical apply knowledge from giftedness research and promotion/training.

The research sector is closely connected to the practical projects within the OZHB. Being constantly informed by practice, it provides a steady flow of information for course design, teacher training, and diagnostics in a way that ensures the latest theoretical approaches to giftedness.

Training courses are offered for teachers, student teachers, and kindergarten teachers. Training offers are intended to facilitate their acquisition of specialized knowledge when it comes to identifying and adequately promoting gifted students in schools as well as kindergartens. Educators taking part in these training courses receive a diploma after completing them. University students wanting to become teachers in MINT subjects get the chance to actively participate in practical projects and thus gain experience in working with gifted students.

To further raise future teachers' awareness of giftedness identification, promotion and adequate measures to be taken in the classroom, theoretical seminars dealing with those aspects of giftedness are offered in addition to practical courses. One of the main aims of this part of the OZHB is to spur professionalization processes of future and in practice educators so that gifted students can be more easily identified and promoted in regular school settings. This also includes pre- school and kindergarten teachers who are often overlooked when it comes to specialized training in the region.

The potential of gifted students in turn is facilitated through practical courses as an enrichment offer. These practical courses include the projects Kolumbus-Kids, Biology Up Close, teutolab-robotics, as well as Biology for Everyone. The offers range from one day workshops to regular courses throughout a school year (for more information, see also www.uni-bielefeld.de/biologie/Didaktik/BotZell/ozhb/projekte.html, German version only).

The enrichment program Kolumbus-Kids was established at Bielefeld University in 2006. Every semester, 150 scientifically gifted students from grades 4-7 (age 10- 12 years) engage in scientific working processes and active problem-solving tasks in the program apart from their regular time spent at school (see also Wegner & Grotjohann (2010) for more information). The projects Biology Up Close and teutolab-robotics entail workshops designed for students from grades 8-12 (13-18 years). Taking part in Biology Up Close, about 3000 students per year experience close contact with and investigate various animals at university (see also Wegner & Strehlke (2015)). The project teutolab-robotics offers students a chance to engage in the fields of technology and robotics. Biology For Everyone was developed to support newly arrived students with their language development through language sensitive (biology)

teaching (see also Schmiedebach & Wegner (2018)). The main goal of all four practical offers is to spark scientifically gifted students' interest when taking part in the workshops or courses, identifying giftedness through testing and in a last step promoting their abilities the best possible (e.g. through further contacts or training).

The three strands of the OZHB are thus always in constant interaction and exchange (see Figure 2). The theoretical basis of giftedness research thus forms the basis for individual teaching methodologies and planning the courses which are then in turn carried out and evaluated. Evaluation then informs theory building again.

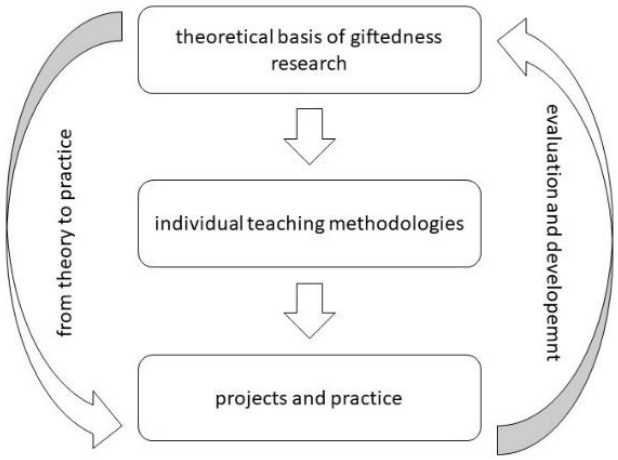

Figure 2.
Schematic Overview of Research and Practice Evaluation at the OZHB

Based on this transfer from theory to practice, a number of research projects are carried out at the OZBH. Table 1 displays areas of research which are relevant for the center along with potential and ongoing research projects. One of these areas is the evaluation of teaching concepts designed for promoting gifted students. Taking a closer look at gifted students within the programs, potential effects of the courses on their interest and motivation as well as their epistemological beliefs are investigated. The last area of research primarily focuses on the development of teacher training and professionalization.

Table 1.
Research Areas and Potential Research Projects

Evaluating teaching concepts	Development of interest and motivation	Epistemological research	Developing training courses
Developing training methods for underachievers and learners with Asperger Syndrome	Effects of promoting giftedness on cognitive and social affective factors Biographic research into sustainability of enrichment programs (e.g. long term development of interest and motivation for natural sciences)	Analyzing gifted students' scientific ways of working processes within enrichment programs	Developing diagnostic tools for being scientifically gifted Conducting qualitative and quantitative research projects as a part of teacher professionalization (e.g. diagnostic competences, quality of lessons, differentiation)

The OZHB's structure is designed to enable a constant exchange between theory and practice to further benefit gifted students in the region. Through practical projects and their scientific evaluation, the OZHB contributes to the identification and promotion of gifted students. Courses designed to further educate practitioners as well as future teachers aim at not only increasing awareness for gifted students in the classroom but also creating learning environments which foster gifted students' abilities at schools.

Conclusion

Its unique structure allows for an efficient combination of research and practice and can serve for a model for similar centers. Gifted students are fostered in specific workshop-like settings while at the same time these practical

approaches are evaluated scientifically. This way, research and practice are in constant exchange. Findings from research and practice can then be passed on the practitioners and thus improve identifying, integrating, and fostering gifted students in actual classroom practice.

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