

METHOD FOR THE CONSTRUCTION OF STUDENTS' SCIENTIFIC IDENTITY WITHIN ENGLISH FOR ACADEMIC PURPOSES: THE CASE OF INTERNATIONAL STUDENTS OF MASTER PROGRAMME "INFORMATION AND ELECTRICAL ENGINEERING" AT HOCHSCHULE WISMAR

Andreas Ahrens

Hochschule Wismar, Germany

Jeļena Zaščerinska

Centre for Education and Innovation Research, Latvia

Julija Melnikova

Klaipeda University, Lithuania

Abstract. *Reaching the Goals of the 2030 Agenda for Sustainable Development is facilitated by science development. In order to strengthen scientific efforts in implementing the 2030 Agenda, the number of our modern society's members who associate themselves with scientific community has to be increased. The research question is as following: What method promotes the construction of students' scientific identity in language education within higher engineering education? The aim of the present research is to analyse the inter-connections between scientific identity and language education underpinning empirical analysis of use of biographical methods in English for Academic Purposes within Master programme "Information and Electrical Engineering" for International students at Hochschule Wismar. Research methods include theoretical and empirical methods. Theoretical methods comprise analysis of theoretical sources and theoretical modelling. The research methodology implies the study of the meaning of the key concepts of "scientific identity", "language education" and "biographical method". Moreover, the study demonstrates how the key concepts are related to higher engineering education. The empirical study was carried out at Hochschule Wismar in 2018. The data reveals students' positive evaluation of use of biographical methods in English for Academic Purposes studies. The novel contribution of the paper is the newly formulated research question.*

Keywords: *biographical methods, English for Academic Purposes, international students, higher engineering education, language education, role models, scientific identity.*

Introduction

Reaching the 17 Sustainable Development Goals and 169 targets declared in the 2030 Agenda for Sustainable Development (United Nations, 2015) is facilitated by science growth and development. In order to strengthen the science efforts in implementing the 2030 Agenda, the number of our modern society's members who associate themselves with scientific community has to be increased. Thus, the guiding research question is as following: What method promotes the construction of students' scientific identity in language education within higher engineering education?

The aim of the present research is to analyse theoretically the interconnections between scientific identity and language education underpinning empirical analysis of use of biographical methods in English for Academic Purposes within Master programme "Information and Electrical Engineering" for International students at Hochschule Wismar, Germany.

Research methods include both theoretical and empirical methods. Theoretical methods imply analysis of theoretical sources and theoretical modelling. The research methodology comprises the study of the key concepts of "scientific identity", "language education", "role models" and "biographical method". Moreover, the study demonstrates how the key concepts are related to higher engineering education. The empirical study was carried out at Hochschule Wismar in Germany in February 2018. Observation served as the basis for data collection. The novel contribution of the paper is the newly formulated research question.

Literature review

Science or, in other words, scientific identity is the sense of who students are, what they believe they are capable of, and what they want to do and become in regard to science (Brickhouse, 2001). Researchers also emphasize the interconnections between scientific identity and role models (Arhipova, 2018, 42): scientific identity is an element of role model (Zaščerinska, Andreeva, & Aļeksejeva, 2015). Role models assist in guiding individual's personal development, making important decisions that affect the human well-being and finding satisfaction and fulfillment in individuals' lives (Zaščerinska, Andreeva, Glonina, Zaščerinskis, & Aļeksejeva, 2016). In higher education, use of role models is traditionally considered from one perspective only: students are users of role models created by their educators despite that engineering students indicate that they are role models for their friends, family members and colleagues (Zaščerinska, Andreeva, Glonina, Zaščerinskis, & Aļeksejeva, 2016).

Construction of scientific identities is built through individual's experience (Arhipova, 2018, 51). While individual's experience plays the central role in the knowledge construction process (Maslo, 2007), individual's life experience is portrayed by biography. The method of biographical analysis, or, in other words, biographical method, is identified as a tool for constructing their identity (Arhipova, 2018):

- On the one hand, biographical method serves as a causal model, i.e. a person on a subconscious level builds his life, depending on the events that happened to him before, especially in childhood.
- On the other hand, biographical method is an instrument to study the dynamics of social phenomena, norms and values through the prism of individual experiences of individuals or families. As empirical studies reveal, the culture norms and values of international students and educators of Master programme "Information and Electrical Engineering" at Hochschule Wismar, Germany, differ (Gruenwald, Ahrens, Zaščerinska, Melnikova, & Andreeva, 2018).

The construction of scientific identity is mediated via academic language (Zaščerinska, Andreeva, Zaščerinskis, & Aļeksejeva, 2016). English for Academic Purposes studies as part of higher engineering education are an opportunity for the development of students' scientific identity (Zaščerinska, Andreeva, Zaščerinskis, & Aļeksejeva, 2016). The close inter-relationships between English for Academic Purposes studies and role models have to be pointed, too: two elements, namely individual's identity and cognition of three (individual's identity, cognition and social interaction) of both English for Academic Purposes studies and use of role models coincide (Zaščerinska, Andreeva, & Aleksejeva, 2015). Figure 1 illustrates the hierarchy of inter-connections between role models, scientific identity, biographical method and English for Academic Purposes studies.

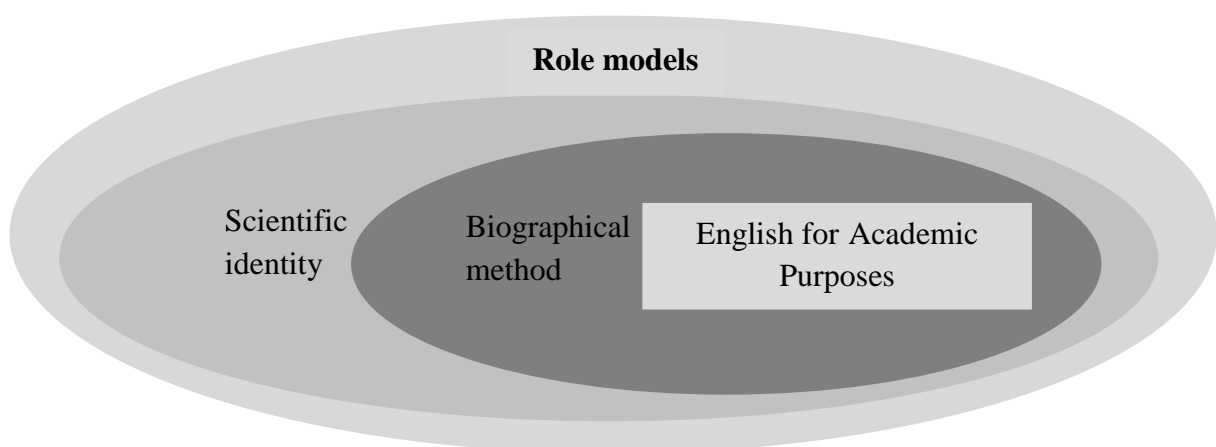


Figure 1 The hierarchy of inter-connections between role models, scientific identity, biographical method and English for Academic Purposes studies

Thus, biographical method was integrated into English for Academic Purposes studies (Zaščerinska, 2009). Students of English for Academic Purposes were suggested to prepare and make a PowerPoint presentation on the biography of an outstanding person (Zaščerinska, 2009) in the students' degree study area (engineering, economics, management, etc). However, further enhancement of the biographical method requires analysis of the historical development of biographical method within different scientific fields.

Table 1 based on the analysis of the scientific literature (Zaščerinska, 2009; McLean & Abbas, 2011; Zaščerinska, Andreeva, & Aleksejeva, 2015; Zaščerinska, Andreeva, Glonina, Zaščerinskis, & Aleksejeva, 2016; Zaščerinska, Andreeva, Zaščerinskis, & Aleksejeva, 2016; Arhipova, 2018) outlines the main stages of the development of the biographical method in different scientific fields.

Table 1 Historical development of the biographical method within different scientific fields

Historical period	Scientific field	Use of biographical method
1920s	Sociology	A large study of Polish farmers in Europe and America
2009	English for Academic Purposes	Students' presentations on an outstanding person's biography (focusing on person's way of growth, achievements, and reasons of success) in the students' degree study area (engineering, economics, management, etc)
2013	Teaching of university sociology	Sociology lecturers teach by way of biographical methods in order to tackle pedagogical difficulties associated with the increasing marketisation of higher education and the depoliticised attitudes of the students
2015	English for Academic Purposes	Students' writing of their own short biography (200 words) to be included in their scientific publications

Source: created by the paper's authors.

Methodology

The present part of the paper demonstrates the design of the empirical study. The design of the present empirical study comprises the question and purpose, sample and methodology of the empirical study.

The guiding question of the empirical study was as follows: What is students' evaluation of use of biographical method within English for Academic Purposes? It should be noted that English for Academic Purposes is part of language education (Zaščerinska & Aleksejeva, 2012). Language education or the languages of education is an overarching concept for language as a subject,

language across the curriculum and foreign languages (Aase, 2006, 4). Language proficiency and problems is a concept of the theoretical framework on master programme for international students (Ahrens, Gruenwald, Bassus, Zaščerinska, & Melnikova, 2017).

The purpose of the empirical study is to analyse students' evaluation of use of biographical method within English for Academic Purposes.

The exploratory type of the case study research has been applied (Zainal, 2007) in the present empirical study as case studies have an important function in generating new research questions, hypotheses and building theory (Kohlbacher, 2005). Exploratory case studies set to explore any phenomenon in the data which serves as a point of interest to the researcher (Zainal, 2007).

The interpretive paradigm was used in the empirical study. The interpretive paradigm aims to understand other cultures, from the inside through the use of ethnographic methods such as informal interviewing and participant observation, and establishment of ethically sound relationships (Taylor & Medina, 2013). The interpretive research paradigm corresponds to the nature of humanistic pedagogy (Lūka, 2008, 52). The interpretive paradigm creates an environment for the development of any individual and helps them to develop their potential (Lūka, 2008, 52). The core of this paradigm is human experience, people's mutual everyday interaction that tends to understand the subjectivity of human experience (Lūka, 2007, 104). The paradigm is aimed at understanding people's activity, how a certain activity is exposed in a certain environment, time, conditions, i.e., how it is exposed in a certain socio-cultural context (Lūka, 2007, 104). Thus, the interpretive paradigm is oriented towards one's conscious activity, and it is future-oriented (Lūka, 2007, 104). Interpretive paradigm is characterized by the researcher's practical interest in the research question (Cohen, Manion, & Morrison, 2003). The researcher is the interpreter.

The sample of the present empirical study was composed of five respondents within the Master programme "Information and Electrical Engineering" for international students at Hochschule Wismar. The five respondents are from different parts of India. Moreover, they represent different field of engineering studies such as electronics, mechanical engineering, electrical engineering, etc. Therefore, the sample is multicultural as the respondents with different cultural backgrounds and diverse educational approaches were chosen. Students' different cultural and educational experience emphasized the significance of each student's evaluation of use of biographical method within English for Academic Purposes (Luka, Ludborza, & Maslo, 2009) within the present empirical study. Thus, the group (age, field of study and work, mother tongue, etc.) was heterogeneous.

The empirical study was carried out in February 2018. It should be noted that the Master programme "Information and Electrical Engineering" at Hochschule Wismar involves the students from India only. However, the Master programme

"Information and Electrical Engineering" is open for all the interested international students. The Master programme "Information and Electrical Engineering" for international students is popular at Hochschule Wismar, Germany, as it ensures such economic resources, that influence the regional economics, as labour and entrepreneurship (Ahrens, Grünwald, Bassus, Andreeva, Zaščerinska, & Melnikova, 2018).

Only five respondents as a case for the study participated in the empirical study as a qualitative research design has been employed (Kohlbacher, 2005). The qualitatively oriented empirical study allows the construction of only few cases (Mayring, 2004). Moreover, the cases themselves are not of interest, only the conclusions and transfers we can draw from these respondents (Flyvbjerg, 2006). Selecting the cases for the case study comprises use of information-oriented sampling, as opposed to random sampling (Flyvbjerg, 2006). This is because an average case is often not the richest in information. In addition, it is often more important to clarify the deeper causes behind a given problem and its consequences than to describe the symptoms of the problem and how frequently they occur (Flyvbjerg, 2006). Random samples emphasizing representativeness will seldom be able to produce this kind of insight; it is more appropriate to select some few cases chosen for their validity (Flyvbjerg, 2006).

Observation was employed as a basis of data collection. Observation is a highly effective method of qualitative data obtaining (Zaščerinska, 2013). Observation makes use of a number of techniques, namely, document analysis, respondent interviewing and students' self-analysis (McCall & Simmons, 1969, 1). Moreover, observation contributes to a more adequate picture that emerges of the research setting as a social system described from a number of participants' perspectives (Geertz, 1973; Burgess, 1984), namely students' evaluation of use of biographical method within English for Academic Purposes. Furthermore, Hargreaves (Hargreaves, 1967, 193) described advantages of participant observation as a research method for those carrying out studies in institutions in which they work: the method of participant observation leads the investigator to accept a role within the social situation s/he studies – s/he participates as a member of the group while observing it. In theory, this direct participation in the group life permits an easy entrance into the social situation by reducing the resistance of the group members; decreases the extent to which the investigator disturbs the 'natural' situation, and permits the investigator to experience and observe the group's norms, values, conflicts and pressures, which (over a long period) cannot be hidden from someone playing an in-group role.

The collected data were processed via structuring and summarizing content analysis focused on such a criterion of students' evaluation as students' attitude. It should be noted that attitude is identified as a combination of evaluative judgments about a phenomenon (Crites, Fabrigar, & Petty, 1994, 620). For the

purposes of the present research, attitude includes two indicators, namely social interaction and cognitive activity (Zaščerinska, 2013). Such constructs of social interaction are identified as students participate in the activity, exchange ideas with others, co-operate with others, analyze a problem, are in the dialogue and search for problem solving tools together with others (Maslo, 2006, 15). In turn, such constructs of cognitive activity are determined as student regulates his/her own learning process, sets his/her own goals, takes responsibility for his/her own learning, works independently, evaluates his/her own learning process and continues to improve his/her own skills (Maslo, 2007, 39). Traditionally, attitude is differentiated into positive, neutral or negative (Ahrens & Zaščerinska, 2014).

Research results

The students' observation carried out within English for Academic Purposes classes devoted to use of biographical method in the Master programme "Information and Electrical Engineering" at Hochschule Wismar started with the students' choosing of an outstanding scientist. All the five students actively discussed their choice of an outstanding scientist in order not to make a presentation of the same scientist. The five students chose different scientists for their presentations. All the five students with Indian educational and cultural background selected an outstanding scientist with Indian roots for their presentations. Three students proposed a biography of an outstanding scientist from a scientific field different from the students' field of degree study. This was considered as an advantage as such an approach to analysing a biography of an outstanding scientist from a scientific field different from the students' field of degree study strengthens students' interdisciplinary perspective on their field of study.

Later, about 15 minutes at the end of English for Academic Purposes class were given to the students to start their PowerPoint presentations on a biography of a chosen scientist in the class in order to motivate the students to continue to do the task. During the given 15 minutes, the students enthusiastically engaged in preparation of their PowerPoint presentation on a biography of the chosen scientist in the class. As all the five students enthusiastically engaged in preparation of their PowerPoint presentation on a biography of the chosen scientist in the class, the respondents enjoyed searching for the detailed biographical information of a chosen scientist on the Internet. The students finished their PowerPoint presentation on a biography of the chosen scientist already after the English for Academic Purposes class.

On the day of the students' presentation, the students demonstrated the well-elaborated slides of their PowerPoint presentations: the students integrated photos and other visual materials in order to highlight the conditions of the working and

family environment of the chosen scientist. The students also provided figures, formulas and schemes in order to demonstrate the scientific contribution and achievements of the chosen scientist.

During the students' presentations on an outstanding scientist with the use of PowerPoint slides, the students spoke in a fast manner. It should be noted that for the use of the biographical method, fast manner of speaking is considered as an advantage as the students wished to provide more information about the scientist. But for the purposes of the development of students' academic presentation skills, fast manner of information delivery is a disadvantage as the listeners cannot perceive the provided information. The students were open to provide even more detailed information about the chosen scientist, clarify the details of scientific contribution of the chosen scientist as well as to answer other students' questions and comment on the educators' remarks.

The observation demonstrated that all the five students participated in the activity, exchanged ideas with others, co-operated with others, analyzed a problem, were in the dialogue and search for problem solving tools together with others (Maslo, 2006, 15) as well as regulated their own learning process, set their own goals, took responsibility for their own learning, worked independently, evaluated their own learning process and continued to improve his/her own skills (Maslo, 2007, 39). Consequently, all the five students have positive attitude to the use of the biographical method in English for Academic Purposes studies. Consequently, the summarizing content analysis (Mayring, 2004) of the data based on the analysis of attitude's indicators, namely social interaction and cognitive activity, reveals that all the five students positively evaluated the use of the biographical method in English for Academic Purposes studies.

Conclusions

The theoretical findings of the present research allow drawing conclusions on the existing inter-connections between role models, scientific identity, biographical method and English for Academic Purposes studies. Moreover, the hierarchy of inter-connections between role models, scientific identity, biographical method and English for Academic Purposes studies was determined such as role models → scientific identity → biographical method → English for Academic Purposes studies. The results of the empirical study allow concluding that the respondents positively evaluated the use of the biographical method in English for Academic Purposes studies. The following new research questions has been formulated: What is engineering students' evaluation of writing their own short biography (200 words) as required by scientific publications? The present research has limitations. The inter-connections between role models, scientific identity, biographical method and English for Academic Purposes

studies have been set. As well as the hierarchy of inter-connections between role models, scientific identity, biographical method and English for Academic Purposes studies has been established. Another limitation is the empirical study conducted by involving only the students of one master programme at one higher education institution. Therein, the results of the study cannot be representative for the whole area. Nevertheless, the results of the research – the hierarchy of inter-connections between role models, scientific identity, biographical method and English for Academic Purposes studies - may be used as a basis of evaluation of use of biographical methods. Further research tends to implement a comparative analysis of use of biographical methods within English for Academic Purposes from students' perspective. Empirical analysis to reveal effectiveness and impact of use of biographical method within English for Academic Purposes is proposed.

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