

Personal Professor of Life Science Education Research

Wageningen University is a university with a strong research profile. Education at Wageningen University flourishes and receives a lot of attention and positive feedback. Changes in the now around 35 Bachelor and Master programs have resulted in a significant growth in students numbers. Although teacher support, teacher training and program consultancy is covered well, and the university's education quality management procedures are working well, the amount of research on the policy, innovation, development, implementation and evaluation of education is still limited. This is remarkable since education is one of the primary tasks of the university. Furthermore, Wageningen University has a number of special features (global and societal relevance of programs, small scale, personal, fundamental with applied perspective, student-centred, flexibility in programs, intercultural, interdisciplinary) which makes it exemplary in life sciences education worldwide. The education philosophy can be a reference for other higher life sciences (agricultural) education institutions worldwide.

Need for extension of Research on Education within Wageningen University

The research profile of Wageningen University can be further extended to the support of the development of education. As in medical education, life science education should have its own strand of educational research. Certain chairs in Wageningen University, especially in the AFSG (e.g. Tramper; Gruppen; Van 't Veer), but also in other Science Groups (e.g. Antonides) conduct research in their education domains. During recent years, various Master- and PhD-students graduated in these domains. Their work has been published in journals in the respective science or in pedagogical content knowledge (vakdidactiek) domains. Publications in the journals in the learning sciences (with a higher impact) however have been rare, whereas the investments in the PhD-studies have been considerable. This can be seen as a lost opportunity, but also as a challenge, which can be addressed by linking research projects on educational development within Wageningen University to advances in the education and learning sciences.

Examples of current research themes which are relevant for Wageningen University are curriculum (re-)design based on an explicit educational philosophy (didactisch concept), the use of instructional design models for complex cognitive skill acquisition (such as in physics), multi-media simulation models for the support of learning in fields in which there is scarcity or lack of real learning material (for instance regarding living animals in biology or zoology), or where there are hazards for people and nature (for instance in

chemical experiments), access to authentic work contexts (such as in development and educational studies, where good use is being made of video-support and feedback). Other examples are argumentative computer-supported collaborative learning (in ill-defined science fields), the pedagogy of international (including intercultural) education, and eye-movement tracking and modelling of learning (to analyse expert behaviour of educational purposes) to name just a few.

Profile and position of the chair

Since Wageningen University does not teach a program on life sciences educational science, and this chair is not included in the IPOP chair plan, the chair will be created as a personal chair for research and development only. However, it can be expected that results of research and development projects can be used for professional development of university teachers and staff, course development, distance learning, the pedagogy of several subject areas as well as interdisciplinary and intercultural education.

Furthermore, the research can be connected to the growing teacher education program within Wageningen University.

The chair will be positioned within the chair group of Education and Competence Studies. The chair will complement the profile of the chair group. This will be explained in the next section.

Research themes and contributions of ECS

Throughout the last ten years the chair group has developed a productive and growing research program focusing on competence development. This theme has gained enormous attention in vocational and professional education, in the Netherlands, but also in Europe and other continents. There have been critical evaluations of the concept of competence-based education, but these should mainly be attributed to budget cuts, extensification, overreliance on self-regulated learning and too little attention to the knowledge base in education. The research program of the chair group successfully contributed to not only the debate about competence-based education, but also to the research regarding pitfalls and ways to overcome them (Biemans, c.s.). There have been several studies in the field on the development of competence profiles of several professionals: purchasing (Wesselink, c.s.), consultants (Karbasioun c.s.; Brinkman c.s.), sustainability (Wesselink c.s.) and innovation experts (Du Chatenier, c.s.) and entrepreneurs (Lans c.s.). This research revealed methodological challenges regarding

this type of research and ways to overcome them. But the profiles also enabled scrutinizing of relationships between innovation, investment, assessment processes, training programs and performance. More studies with longitudinal designs have to be conducted to disentangle the intricate relationships between competence, competence development and performance improvement. Another elaboration of this field of research is to study professional excellence since education has to warrant competence, but also help students to excel in fields for which they have a talent. The research regarding competence profiles also has practical relevance. The competence profiles can be (and indeed are being) used for self-assessment, peer assessment, performance appraisal, and competence development.

Competence-based vocational education measurement

A second contribution to the development and potential measurement of the level to which competence-based vocational education is introduced was the development of the matrix of competence-based vocational education (Wesselink c.s.). The essence of this matrix is that it consists of a series of principles of (good) vocational education which are held relevant for this type of education. Each principle is scaled on five levels of implementation (ranging from partial to full implementation). This grid enables education program teams to map their program and to agree upon policy intentions regarding the further development of the respective program. The matrix is further developed and currently validated in green and vocational education in general (Sturing c.s.)

Authentic competence assessment

A third contribution is made on the field of competence assessment (Gulikers c.s.). The introduction of 'Green proofs' (Groenproeven) was evaluated and further professional development in this field was suggested. Green proofs are proofs of competence in green education. They are practical authentic assessments, whereby a student gets a real job task of which the performance is observed and rated by one or more independent assessors.

Teacher professional development

Also, further research is being conducted into teacher professional development in green education, part of which is related to the implementation conditions, including human resource management conditions, of competence-based green education (Runhaar c.s.).

International education development cooperation

Elements of these research studies regarding competence development are also integrated in international education development cooperation projects in which ECS is involved (in Uganda, Ethiopia, Indonesia, the Western Balkans and Kenya). Research has shown that the principles for competence-based education are robust but that contextual adaptation is needed (Mulder c.s.).

The research program of the chair group is however not limited to studies in the context of vocational and professional education. There is also research about the introduction of environmental education and sustainability in education (Wals c.s.). This research also aims at identifying environmental and sustainability competence (Wesselink c.s.). Related research concerns the introduction of science and technology and related teacher professional development in primary education and teacher education (Aleke c.s.). Research that widens the system of interest is done in the field of knowledge co-creation in the golden triangle (Beers c.s.), in cooperation projects of multiple stakeholders representing governmental bodies, educational institutions and the corporate world as well as research on competence regarding regional development (Oonk c.s.). Projects in these domains are characterized by the fact that they are strongly based on theories of social learning, knowledge about multi-stakeholder innovation process facilitation, situations in which there are strong and opposite beliefs and interests, and open learning outcomes. This research is aimed at understanding the relationships between learning and planning, development, negotiation, innovation, transformation and conflict resolution processes.

Research aimed at Wageningen programs and student learning

Most of this research is aimed at training, education and development outside Wageningen University. However, there is some (small scale) research within the University in which ECS is active. In a recent study the Bachelor program BBC was evaluated (Cox and Gulikers c.s.). This research was especially done to see whether the study program was sufficiently challenging for the students. The conclusion of the study was that the study program has more than enough opportunities for students to develop

themselves further to the degree they want. At the technological side, ECS has been working on timing of theory presentation in a methodology course in epidemiology research (Noroozi c.s., a,b,c). This research showed that there are different effects of different moments of theory presentation in a specific e-learning learning environment. Further research in this line is done to evaluate the effects of different scripts in asynchronous learning of teams in and e-learning platform. This research is particularly interesting for the Wageningen University policy on distance education. More technological research is being done on the effects of digital guidelines attached to an experiment designer in chemical engineering (Biemans c.s.). This study is currently under way and no results are known yet.

Other research within Wageningen is aimed at the assessment of study and career orientation of students within Wageningen University (Gulikers c.s.). Although quite practical of nature, and therefore difficult to publish, the research has convinced several Education Committees/Program Directors to include this assessment in the study program. Others may follow once the experiences with this assessments will be positive. Also important within Wageningen is the intercultural cooperation between students in course work. There are mixed feelings about this cooperation and not all feelings are positive. In a study regarding the Academic Consultancy Training course learning preferences and intercultural cooperation challenges were studied (Popov c.s.). This research may lead to further attention within the university to this sensitive issue. The current idea is that if the university values intercultural cooperation between students (it used to be one of the core competences to develop), student efforts in that respect should be credited and specific intercultural training should be given. Simulations of cooperation challenges could serve authentic representations of the reality of the working life after graduation in which colleagues are not necessarily friends.

PhD students as educational designers and researchers

A final specific program is worth mentioning, which is about making use of PhD research in Wageningen University in the orientation of PhD students towards the teaching profession in the Netherlands. Currently 10 PhD students are developing (and a larger group is waiting to start), implementing and testing learning materials for the second phase of secondary education using their own PhD theme. In this way schools get recent relevant research-based learning materials, pupils get in contact with real researchers and current research, and students can learn if engaging in a teaching career would be an interesting option for them.

Development of the research programme of ECS

The research program of ECS has grown significantly during the last 10 year. Started as a new and small chair group, it now works with over 60 staff members and PhD students. The research programme consists of six themes:

1. Competence-based vocational and professional education;
2. Competence and learning for sustainable development;
3. Competence development and knowledge arrangements;
4. Competence, innovation and entrepreneurship;
5. Learning in higher education;
6. Emerging theme: continuing professional development.

The coherence of the themes is depicted in the model below.



There are three perspectives regarding the research themes: the education and learning perspective, the societal perspective and the sustainability perspective, related to the wider issues regarding the development of human resources (people), socio-economic development (profit) and global concerns (planet). As the model shows, ECS conducts studies to generate knowledge regarding the optimalisation of education and learning in

the given contexts, and the transformation of education and learning, whereby fundamental change of education and learning systems is at stake.

The current chair holder is responsible for all research themes in the chair group. Prof. dr. ir. Arjen Wals, in his role as endowed UNESCO chair for social learning and sustainable development, takes responsibility for the theme competence and learning for sustainable development. Dr. Harm Biemans, Associate Professor, and Dr. Renate Wesselink, Assistant Professor, are active in the field of competence-based vocational and professional education and human resource development. Dr. Biemans is also working on Learning in higher education. Dr. ir. Thomas Lans, Assistant Professor works on competence, innovation and entrepreneurship. Dr. Piety Runhaar, recently appointed Tenure Track Assistant Professor, works on continuing professional development. The theme Competence development and knowledge arrangements will probably be expiring.

On top of this, the group Research Methodology moved from the chair group Environmental Policy to ECS. Dr. Hilde Tobi is Associate Professor of this group.

Given the size of the group, the Departmental tasks of the chair holder, the opportunities for doing educational research within Wageningen University itself (and other Higher Education Institutes), the financial reserves of ECS, the time is right to search for and appoint a personal chair in Life Sciences Education Research.

Personal chair – tasks and position

The professor of Life Science Education Research will be responsible for the field of learning in higher life sciences education. He or she will initiate, acquire and conduct evidence-based research projects on:

- Aligning educational philosophies of programs and the respective curricula.
- The relationship between (inter-)disciplinary, sectoral and societal developments, competence requirements of professionals who graduate from higher life sciences education institutes, graduate attributes, and curricula of these institutes;
- Efficacy, reliability and validity of student selection;
- Course and instructional development, including gaming and simulation;
- The advancement of the level of learning processes and the quality of learning outcomes;
- The augmentation of the quality of measuring student achievement and teaching performance;

- The effectiveness of educational innovation in Wageningen University BSc and MSc programs, especially regarding various teaching methods and curriculum components (practicals, guidelines, internship, thesis research);
- Internship and alumni research;
- Learner support within multi-media education, e-learning and distance learning, including CSCL-platforms;
- The pedagogy of intercultural and interdisciplinary cooperative learning;
- Development of a reliable and valid education quality measurement system (beyond Evasys);
- The professional development of teaching staff;
- The study of workplace learning of alumni and creating digital links with initial education of students.

All this is aimed at research within the science domains of Wageningen University, at the level of BSc-, MSc- and PhD-education.

The chair will also have teaching commitments, although this is a minor part of the position (around 20%). Teaching responsibilities will be positioned in the minor Education. However, other teaching opportunities at BSc, MSc and PhD level will also be explored and utilized (see below).

Further tasks are:

- To create a network of staff members within Wageningen University who are carrying out or using educational research;
- To create an international network of research colleagues in the field of life sciences education research;
- To actively disseminate research findings in international conferences;
- To engage in international education development cooperation in the higher agricultural education sector.

The chair will be placed within the chair group of Education and Competence Studies. The new professor will have a relationship of agreement (overeenstemmingsrelatie) with the head of the chair group.

The chair will have to comply with the tenure track criteria of Wageningen University for the appointment of personal professors.

The chair will be installed for a period of five years, with the possibility of getting a permanent position after that period.

The chair will be financed out of the reserves of the chair group.

Education

As stated, the tasks of the chair will be mainly aimed at research. However, as also indicated, there are opportunities for education. First of all, there are the possibilities to share study results with the unit which is responsible for Teacher Support, so that new insights will be available for the teaching staff of the university. New results can also be integrated in courses which are offered in the Basic Teaching Qualification (BKO) trajectory.

Apart from that, there are opportunities for special educational research assignments for students at BSc, MSc and PhD level. Incidentally, BSc students get the assignment to study parts of the educational programs in which they take part. This is especially done for program improvement purposes. This happens also at the MSc-level, but there are also MSc-students who do a thesis in the field of educational research. The number of these MSc-thesis students could be raised. At the PhD-level – as mentioned – a program is now running called Acklas, which is an acronym for Academics in front of the Classroom. In essence, this is a program in which PhD-students make learning materials on their PhD study for pupils in the second phase of secondary education. The PhD-students are required to also pilot-test these materials in real classroom settings, and to evaluate the results of this education. The purpose is to raise interest in education at the side of the PhD-students and to provide secondary education with current research-based education materials. The first signs are that this program will be successful, and that a follow-up will be needed.

Finally, the natural basis for the personal chair is the teacher education program of Wageningen University. For those who are not well informed about the renewal of the teacher education program in Wageningen, the successful completion of the minor Education (30 credits) together with a bachelor diploma that is related to a school subject, give a second-degree teaching license. Wageningen University has an NVAO-accreditation for this teaching license for the subjects biology, chemistry, physics, geography and economics. Students of the minor (especially in the course Learning and Instruction Theory) can take part in research assignments of the chair. The other way around, the chair can also give input to the teaching in the minor.

Requirements

The candidate who would like to be appointed in this position should at least have:

1. a PhD in educational research in the specialisation of higher education research;
2. a proven record in the fields of research as described above;
3. extensive experience in setting up new courses and teaching university students at BSc, MSc and PhD level;
4. 20 credits for scientific research publications on average during the last three years (based on the Tenure Track standards of Wageningen University);
5. have experience with acquiring, supervising and completions of PhD-projects;
6. a strong international research portfolio and network;
7. leadership and management qualities;
8. advanced data analysis qualifications;
9. excellent writing skills;
10. excellent teaching skills.

Furthermore, the candidate has to be:

1. fluent in English; commandment of the Spanish, French or German language is an asset;
2. an ambitious team builder;
3. a potential partner of science-driven chair groups;
4. creative in finding solutions for various challenges;
5. innovative in terms of research domain and research methods;
6. organised;
7. results-oriented;
8. communicative;
9. practical and theoretical;
10. prepared to travel abroad;
11. a cosmopolitan, given the international identity of Wageningen University.

These requirements have to be substantiated by evidence.

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