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Journal of the European Honors Council, Volume 2, No. 1

Contents

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Instructions for authors

We invite you to submit research papers, as well as notes on good practices or preliminary research results to the Journal of the European Honors Council. Instructions on how to contribute can be found on the website www.jehc.eu.
There are two options for contributors: peer-reviewed papers or edited notes.

1. Peer-reviewed paper

This is a contribution of between 1,500 and 5,000 words (approximately). After receiving your paper, the editorial board will send it to two reviewers who remain anonymous to the authors. The reviewers can indicate if they accept the paper (with minor changes), ask you to submit a new version with major changes, or reject the paper. Major considerations are:

- The paper is written in English, in a clear and concise language that will help editors and reviewers concentrate on the scientific content of your paper.
- The paper is relevant in the context of the EHC goals (see below).

2. Edited note

This is a contribution of between 500 and 1,500 words (approximately), briefly summarizing (preliminary) findings or good practices. Notes are edited by the editorial board. They need to be written in English, in a clear and concise language that will help readers to concentrate on the content, which should be relevant in the context of the EHC goals (see below).

In all cases, authors should send in their manuscripts following the template which can be found through www.jehc.eu. Contributions are considered in the order they are received. Once accepted, we aim to publish as quickly as possible. Online publishing is in pdf-files.
In case of questions, the Editorial Board of the Journal of the European Honors Council can be contacted by e-mail: journal@honorscouncil.eu.

The European Honors Council pursues the following goals:

1. Supporting and stimulating development of honors education and its structural embeddedness in the education system
2. Creating a common language
3. Supporting teacher professionalization (within honors)
4. Creation and exchange of knowledge about honors programs
5. Stimulating and facilitating research about honors
6. Enabling networking for people involved in honors
7. Stimulating spin-off of successful honors practices to regular education
8. Promoting an easier flow of talented students from secondary to higher education
9. Stimulating professional development of honors students and connection to working life / research career
10. Stimulating collaboration and inspiring student exchange at honors level

Introduction: applying a research-based approach in talent development

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1. Introduction

The Editorial Board is honored to present you the third issue of the Journal of the European Honors Council (JEHC). With the JEHC, we aim to share knowledge and good practices regarding honors programs and talent development programs in higher education. This third issue (volume 2, issue 1) is the result of an open call for papers.

Still, we can discern a common theme in this issue. The contributions show how a research-based approach can be practically applied in talent development, both in the didactical approaches and the organizations of programs for talented students.

2. The papers

The issue contains three peer-reviewed papers.

The first contribution comes from France: 'An ambitious 5-year honors program in French universities: CMI-FIGURE.' Ramona Barbour Eisen, Yves Bertrand, Lamine Boubakar, Jean-Pierre Gesson, Sylvie Pautrot, and Rodolphe Vauzelle describe the 'Cursus Master en Ingénierie' (CMI) program, as well as the 'Formation à l'InGénierie par des Universités de Recherche' (FIGURE) university network, and analyze its development and place in the French higher education context. CMI is a 5-year academic program designed for the most ambitious students in systems engineering. Key features of the frame of reference established by the FIGURE network are selection of students based on high school records and interviews, a strong link with research from the start, 20% additional coursework compared to the supporting bachelors and masters, at least 25% of ECTS credits in applied learning situations, development of self-assessment skills, and compulsory international mobility. After completing a CMI program, the students receive a master's degree from their home university and a national certificate co-delivered by the university and the network.

The second contribution comes from the Rotterdam University of Applied Sciences (RUAS) in The Netherlands and is titled 'Powerful Learning Environments: A Guide to Designing Innovation Labs,' written by Ineke Miltenburg and Ron Weerheijm. The RUAS Honors Program aims to encourage students to develop into excellent professionals. To do so, RUAS has developed a competence profile entitled 'Learning to Innovate.' This profile serves as a guide for designing a teaching approach that enables students to actively develop into such professionals. In this paper, the authors first explain the essence of an Innovation Lab or I-lab. Then, they present some additional considerations and various different approaches to designing a powerful learning environment like the I-Lab.

The third contribution, 'Implementing theory in the design of a professional development course for honors teachers: A Teacher's Road to Excellence,' comes from Hanze University of Applied Sciences Groningen, The Netherlands. The authors, Marjolein Heijne-Penninga, Inge Wijkamp, Maarten Hogenstijn, and Marca Wolfensberger, emphasize that teacher development courses should be based on research to promote their success and impact in practice. They translate the findings of research studies and theories into evidence-based design principles for a professional development course for honors teachers. This course was evaluated on the level of teacher reaction, teacher learning, outcomes, and organizational response. Nine design principles were formulated and translated into concrete actions resulting in the one-year course, 'A Teacher's Road to Excellence.' In an evaluation among participants, impact on honors teachers is clearly seen, and there are some signs of impact on student learning outcomes.

3. The notes
In addition to the three papers, this issue also contains three notes: shorter pieces showing good practices and/or preliminary findings.

The first two notes are closely interrelated, elaborating on two of the three pillars for honors didactics that were first formulated by Wolfensberger (2012). Students who are able and motivated to do more than the regular curriculum offers, the honors students, call for a specific pedagogical approach by teachers. The contribution 'Offering freedom as a teaching strategy for honors students' by Tineke Kingma, Marjolein Heijne-Penninga, and Marca Wolfensberger from both Windesheim University of Applied Sciences and from Hanze University of Applied Sciences Groningen, The Netherlands concentrates on the aspect of 'offering freedom' concerning teaching strategies that give students space for experimentation, risk-taking, personal initiatives, and pursuit of their interests (Wolfensberger, 2012). In this literature study, the authors elaborate on teaching behaviors that contribute to 'Offering Freedom.'

The second note focuses on 'Creating community' as a teaching strategy for honors students and can be considered as a sequel to the previous note about offering freedom. The authors Marjolein Heijne and Marca Wolfensberger are from Hanze University of Applied Sciences Groningen, The Netherlands. In this literature study about honors communities, they go after the teaching strategies that contribute to 'Creating community.' They argue that teachers seem to play a crucial role in facilitating the development of an honors community. The authors distinguish three clusters of teaching strategies that can foster the creation of a community: building an effective relationship between teachers and students, creating a

positive and supportive spirit, and making the teacher part of the community in a practical and personal sense.

The third note, 'On student reflective portfolios in honors education,' is written by Merel van Goch from Utrecht University, The Netherlands. This note describes the use of portfolio reflections in undergraduate honors education to foster and assess the development of students throughout their honors education and their regular program. Students commonly reflect on their education and development at set times, and reflections are typically assessed formatively. The author describes the use of reflective portfolios in the Humanities Honours Programme at her university. By looking back and looking ahead at fixed moments in the students' curriculum, the portfolio forms a continuing element in students' study careers.

4. Final remarks

The practical perspective of many of the contributions to this issue shows the determination of those working in talent development and/or honors programs in higher education to learn from each other, share good practices, and critically reflect on how to challenge students who are willing and able to do more than the regular program offers.

The Journal of the European Honors Council aims to facilitate this process of learning from each other. Therefore, it is proudly published in full open access under a CC-BY license. This license means that the work can be shared as long as the source is credited. Authors retain copyright of their contributions. This policy is fully in line with the aims of the European Honors Council, facilitating an easily accessible platform for exchange of research insights and good practices. To further facilitate exchange, the European Honors Council invites you to become a member through its website, www.honorscouncil.eu. Membership is free, but you are asked to fill in a questionnaire about yourself and your institution.

The Editorial Board of the JEHC invites you to contribute to the next issue(s) of the Journal by sending in your papers and notes. In the next issue, we aim to focus on good practices. However, all contributions focusing on talent development in higher education are welcome. The call for contributions can be found on the website www.jehc.eu.

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An ambitious 5-year honors program in French universities: CMI-FIGURE

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Abstract
In this paper, we will describe the Cursus Master en Ingénierie (CMI) program, as well as the Formation à l'InGénierie par des Universités de REcherche (FIGURE) university network, and analyze its development and place in the French higher education context. Overseen by the FIGURE university network since 2012, CMI is a 5-year academic program designed for the most ambitious students in systems engineering. In the fall of 2017, 107 CMI programs recruited first-year students in 28 French universities. Key features of the frame of reference established by the FIGURE network are selection of students based on high school records and interviews, strong link with research from the beginning, 20% additional coursework compared to the supporting bachelors and masters, at least 25% of ECTS credits in applied learning situations, development of self-assessment skills and a compulsory international mobility. Accreditation of the university is granted by the network for 5 years. After completing a CMI program the students receive a master's degree from their home university and a national certificate co-delivered by the university and the network.

Keywords: honors; excellence; master; engineering; university; higher education; network; France

1. Introduction
Higher education in France, indeed the entire educational system, is based on the principle enshrined in the Code of Education of equal opportunity for all. Despite the central importance of equality, all studies on the subject show that the current French system is profoundly inegalitarian, perhaps the most inegalitarian of all OECD countries (CNESCO, 2016). Higher education in France, despite its underlying commitments, reflects this systemic inequality. In France, academic excellence in higher education is generally associated with the complex and highly selective "Grandes Ecoles" system and less with universities known for providing access to all.

That said, French universities have always attracted talented students, increasingly through targeted programs (Ollivier De Leth & Hogenstijn, 2017). One of the most recent and undoubtedly the most ambitious examples is the CMI-FIGURE (CMI referring to Cursus Master en Ingénierie i.e. Master of engineering curriculum; FIGURE to Formation à l'InGénierie par des Universités de REcherche i.e. the network of Engineering programs through research universities).

Guided by a desire to keep universities accessible to all, while fostering programs likely to attract ambitious students, in 2011 the French government launched a call for projects under the name IDEFI (translated as Innovative Programs Excellence Initiatives), with a budget of € 150 million. *"This call for projects aims to support emblematic and innovative higher education projects. The goal is to enhance teaching innovation by supporting a limited number of ambitious initiatives meeting high international standards. The projects must lay the ground for university programs of the future and promote new teaching approaches and new content. These innovations are expected to address issues of attractiveness, multidisciplinarity, student employability, links with research and pedagogical engineering."* (ANR, 2011, first lines of presentation translated from French).

The project CMI-FIGURE, initially launched by 10 French universities, was the highest ranked of all applications with a budget of € 10 million for the period of April 2012 to April 2019. Overseen by the FIGURE university network, the project offers academic programs designed for the most ambitious students, programs analogous to honors programs now being developed in Europe and worldwide (Wolfensberger, 2015) as defined by the EHC: *Honors programs are selective study programs linked to higher education institutions. They are designed for motivated and/or gifted students who want to do more than the regular program offers. These programs have clear admission criteria and clear goals and offer educational opportunities that are more challenging and demanding than regular programs.*

The CMI-FIGURE project drew on a study by the French AERES (Agency for the Evaluation of Research and Higher Education; which has since become the HCERES: High Council for the Evaluation of Research and Higher Education) on university training for engineering professions (Chabbal & Menand, 2010). The goal of the CMI-FIGURE project is to train specialized experts qualified to hold upper management level (engineering) positions in a variety of fields, by responding to the expectations of the socioeconomic environment in terms of innovation and openness in multinational contexts. The term "engineering" is used in a very broad sense and applies to systems engineering. The scientific approach, based on knowledge in the areas such as mathematics and in particular computer science, applies to several domains of activity requiring creativity and innovation and involving a range of experts.

2. The Cursus Master en Ingénierie (CMI) project and the FIGURE network

Several aspects of the CMI project (translated as Master of Engineering Curriculum) represent significant innovation within the French higher education system. Of most significance, is the fact that for the first time a network of French universities has been authorized to deliver a national certificate corresponding to a specific academic program (the CMI), collectively established by that network. To ensure consistency within the network, a procedure for accreditation and monitoring based on stringent international criteria was

established. A 36-page frame of reference, updated yearly, was developed to help universities on the one hand and experts responsible for reviewing requests for accredited programs on the other. Accreditation is delivered by a specific commission for 5 years and includes a review after 2 years. After completing a CMI program, students receive a master's degree from their university of enrollment as well as a national certificate co-delivered by the FIGURE network and the university.

The goal of the CMI is to offer to a limited group of highly motivated and ambitious students a specific program which builds on existing bachelor and master's programs and adds 20% more credit hours starting in the first year (see table 1). CMI students are selected based on their secondary school academic records and admission interviews and in rare cases, after admission to university. The CMI differs in this respect from honors programs organized in other countries. That said, the guiding philosophy is identical to that of other honors programs.

Table 1. European Credit Transfer System (ECTS) distribution

Period	ECTS Standard training	Additional 20% ECTS	CMI Total ECTS
Semester	30	6	36
Year	60	12	72
Bachelor	180	36	216
Master	300	60	360

The CMI enhances existing curricula by offering a strong link with research, innovative pedagogy and obligatory international mobility. The following are CMI program guidelines set forth in the frame of reference:

- The internal research dimension relies on one or more nationally recognized research units within the participating universities. These units are most commonly joint research units involving well-known research organizations such as the CNRS, INSERM and INRA or research units internal to these organizations. (In France, research units are large structures with dozens and sometimes hundreds of staff members.) The number of students recruited in the first year of a given CMI is dependent upon staff available in the corresponding research unit or units (lecturers, researchers, engineers and PhD students). The average is currently 15 CMI students per program.
- An appropriate balance (% of ECTS credits) between academic subjects must be respected by the participating universities. The target is 50% for the specialization, 20% for core scientific subjects (mathematics, computer science & physics), 10% for other subjects related to the domain of specialization and 20% for "ouverture sociale, économique et culturelle" (OSEC), translated as social, economic and cultural awareness. Participating universities must meet threshold requirements but are allowed a certain amount of freedom. For example, it would be possible to attribute 40% of a program's ECTS to specialized academic subjects, the additional percentage being redistributed in one or more of the other subjects.
- The CMI places a great deal of importance on the development of social, economic and cultural awareness (OSEC). For this reason, a specific "OSEC" reference document was developed to facilitate their inclusion in CMI programs. This document is

organized around three central themes: languages, personal development and business knowledge:

- Languages emphasizes a minimum of a B2 level in English, or more specifically 785 on the TOEIC, is required to obtain the CMI certificate. Some universities require that this level be met before a student engages in mobility abroad even at a bachelor level. Knowledge of another foreign language is also encouraged;

- Personal development emphasizes different elements: expression and communication (French and English) transversal skills (computers and internet certification, applied learning situations, self-assessment); personal and career objectives (in the first year of study an academic path is established by the student, with the help of his or her program director, and is adapted as needed over the course of the program); general culture (fine arts & literature) and knowledge of the major issues facing society (sustainable development, ethics, geopolitics);

- Business knowledge emphasizes general understanding which is both internal (functioning, rules, sociology) and external (geopolitical and socioeconomic contexts). Five specific business themes are central to a CMI: human resource management and administration, technology management and administration, organization of company life, project management and entrepreneurship.

- The program must include on average 25% applied learning situations: projects (design projects, integration projects, industrial projects), internships in laboratories and companies (minimum set at 20%). One result of this is that the length of time students spend in companies is at least 8 months over the 5 years of the program (table 2).

Table 2. Applied learning for Bachelor (B1-B3) and Master (M1-M2) curricula

Period	Activity
Between B1 and B2	3 to 6 weeks in a company
B2	50-60 h project related to a laboratory (bibliography)
B3	120 h integrated project
End of B3 or between B3 and M1	10 weeks internship (laboratory, company)
M2	160 h integrated project
End of M2	24-week internship

The ultimate goal of these different guidelines is to make the CMI a clearly identifiable certificate at the national and international level, guaranteeing quality through specific requirements while leaving a great deal of latitude to participating universities.

3. The distribution of CMI programs in French universities

The CMI started in September 2012, with 28 accredited CMI programs in 12 universities. The first cohort of students, having completed the full 5 years of study, graduated in October, 2017. Certain pioneer universities (Aix Marseille, Pierre-et-Marie Curie Paris, Paul-Sabatier Toulouse, Poitiers) started CMI programs in 2010 allowing them deliver the CMI certificate as early as 2015. In 2015, 22 graduates from 6 CMI programs in 4 universities were awarded the CMI certificate. The number of graduates included students having started the CMI in 2010 in

their first year of study or in 2011 in their second year of study, some universities having accepted later enrollment. This was also the case in 2016 for 18 graduates from 5 universities. In 2017 the number of graduates was 76 (plus 12 potential graduates, pending validation of the English language requirements). In the future more meaningful data on professional integration or continuation to doctoral programs will be obtained and analyzed by the network based on data collected in each member university. Furthermore, a national association of CMI alumni will be created soon.

The number of accredited CMI programs has expanded over the years to a total of 112 programs in 28 universities in September 2017. The actual number of CMI programs open for first-year recruitment in 2017 was 107 due to insufficient enrollment in 5 programs (see table 3).

Table 3. Number of accredited universities and CMI programs

Starting year	Universities	CMI accreditation	CMI total
2012	12	28	28
2013	14	16	44
2014	20	25	69
2015	21	19	88
2016	25	14	102
2017	28	10	112

The enrollment in CMI programs has grown along with the increase in the number of CMI programs. In the academic year 2017-2018 close to 3,000 students are enrolled in CMI programs. The number of accredited CMI programs is between 1 and 9 per university (see table 4). When several CMI programs exist within the same university a CMI coordinator oversees internal organization and external outreach. The CMI coordinator can organize classes involving all CMI students. These classes, mixing students from different CMI programs, are commonly offered during the first few years of study and help foster a sense of belonging to the CMI community. OSEC classes and workshops lend themselves particularly well to this type of activity. This sense of community is also promoted during specific events organized at the beginning of each academic year. Associations of CMI students are encouraged in each university under the umbrella of a national one (CMI France).

As noted earlier, the CMI focuses on systems engineering. Consequently, the CMI involves domains that are not traditionally associated with engineering programs in France. Most CMI programs fall within a specific area of activity related to a scientific discipline, but some CMI programs are related to other areas of activity (information and communication, sport, tourism and heritage, transportation and mobility and more recently history). Some programs combine different domains such as computer science and mathematics.

A fact sheet specifying the objectives of each CMI program is available on the FIGURE network's websites (www.reseau-figure.fr, www.figure-network.org). Each fact sheet includes information about career opportunities, the list of supporting research units and industrial and international partners. These program fact sheets are accompanied in some cases by

associated job descriptions made available by the National Office of Information on Training and Professions (ONISEP, www.onisep.fr).

Table 4. Number of ongoing CMI programs per university (2017-2018)

University	CMI	University	CMI
Aix-Marseille	9	Montpellier	8
Angers	3	Nantes	4
Avignon et Pays du Vaucluse	5	Orléans	1
Bordeaux	6	Paris Assas	1
Bretagne Occidentale	1	Paris Nanterre	1
Bretagne Sud	2	Paris Pierre-et-Marie Curie	3
Cergy-Pontoise	8	Pau et Pays de l'Adour	4
Franche-Comté	8	Poitiers	6
La Rochelle	7	Reims Champagne-Ardennes	2
Le Mans	1	Rennes 1	1
Lille 1	6	Savoie Mont-Blanc	3
Littoral Côte d'Opale	1	Strasbourg	4
Lorraine	1	Toulouse 3 Paul-Sabatier	8
Lyon 1 Claude-Bernard	2	Valenciennes	1

The number of scientific disciplines represented by the CMI in 2017-2018 is 18; it was 17 in 2016, 15 in 2015, 14 in 2014, 11 in 2013 and 9 in the founding year 2012. The most highly represented ones are those found in areas traditionally associated with engineering, but it is interesting to observe the spread of the concept in other sectors.

4. Organization of the FIGURE network

The FIGURE network is overseen by a piloting committee, a veritable board of directors made up of representatives of each member university. The piloting committee makes pedagogical and strategic decisions covering the entire scope of network actions, examines the network's operational procedures, makes decisions on implementing corrective action and is a creative force concerning evolutions in CMI programs already offered and the entry of new members into the network. The piloting committee acts on suggestions made by the executive office and different work groups. The executive office, composed of a limited number of members, deals with everyday business. It also establishes strategic approaches and drafts action proposals which it implements after validation by the piloting committee. Currently three other committees are involved in the governance of the network.

- The scientific and pedagogical committee enhances teaching within the network by making suggestions on topics shared by all CMI programs such as the alignment of experience, evaluation and pedagogy. Important themes such as a CMI student's progression through the curriculum to the delivery of the CMI certificate, projects and internships, entry into and exit from the curriculum are defined by this committee, which includes university representatives and outside experts. The

committee is supported by work groups each created for a specific thematic area (ex: mathematics).

- The accreditation and monitoring committee approves or rejects new CMI program proposals, making recommendations when needed. After monitoring a newly created CMI program for 5 years, they decide whether or not and under what conditions to renew accreditation. This committee is composed of experts outside the network and members of the network's executive office.
- The strategic committee is in charge of providing a forward-looking vision of the needs and objectives of the CMI programs and fostering partnerships with actors in the private sector, in particular corporate groups and business clusters. As such, it is composed of outside professionals in charge of research, innovation and recruitment in their own organizations as well as members of the executive office.

The network also has an international relations commission made up of representatives from each of its member universities. The goal of this commission is to propose joint initiatives meant to help member universities with their international student recruitment procedures and outgoing student mobility.

Through these different bodies, the FIGURE network's role is to provide quality assurance for CMI-accredited programs and to help them through the dissemination of best practices and training. To this end specific seminars are offered as well as an annual general assembly. The network also offers a methodology to implement a global quality assurance system in universities.

5. Future outlook and conclusion

The CMI has developed quickly over 5 years, now including 107 CMI-accredited programs in 18 specializations. The number of students per CMI program remains low (15 on average with significant variation from one CMI program to another). To a certain extent, this stems from their selective nature. There is, however, a potential for growth within the CMI programs which has not yet been fully exploited in part due to the lack of figures concerning employment rates and continuation to doctoral programs. It has been difficult to provide this information to potential students, as graduation from the program was not fully effective until 2017, resulting in a limited number of program graduates.

The CMI will remain a selective program aimed at the most ambitious students. The program has been designed to offer more diversity in France, based on a strong research support available in university (usually in connection with research organisms like CNRS, INSERM or INRA). So the CMI is closer to the international standard of master of engineering "with honors" than to the French system of "Grandes Ecoles" or Schools of Engineering. The latter prepare students to get a diploma of "ingénieur diplômé" but the CMI will also prepare students able to hold positions as engineers in a 21st century economy (In France the "ingénieurs diplômés" represent only a part of all graduates holding an engineer job).

The question of opening the system to include accreditation of "CBI" (Cursus Bachelor en Ingénierie) certificates has been posed. This will potentially open the project to new students and universities. A university could be interested in setting up a CBI program rather than a full CMI with its strong research requirements. A potential student could wish to enroll in a 3-

year program after completion of secondary school, rather than make a full 5-year commitment.

International openness is another priority. Initially the FIGURE network strongly recommended that programs include international mobility, then made it obligatory (three months, as a minimum) in 2015. Since then the minimum three-month requirement and a recommendation of semester-long mobility have been included in the frame of reference distributed to new CMI students. Given that outgoing student mobility most often takes place from the 3rd year of study on, a significant rise in mobility can be expected in the short term. It is therefore essential that member universities cultivate existing European and international partnerships, in particular partnerships with research units and teaching departments. The FIGURE network can provide support in this area by signing framework agreements with other university networks and by participating in binational and European programs.

The FIGURE network has developed an accreditation procedure that respects international standards and supports quality assurance procedures recognized at the European and International level (the network is a member of the European Network for Accreditation of Engineering Education ENAEE). Central to the accreditation procedure is the respect for the frame of reference with its high standards that emphasize 21st century skills (van Eijl, Peeters, Moesker, Dillen, Pilot & van Ginkel, 2017). This allows CMI programs to guarantee students quality training and successful professional integration in different domains.

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Powerful Learning Environments: A Guide to Designing Innovation Labs

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Abstract

The RUAS Honors Program aims to encourage students to develop into excellent professionals. To do so, RUAS has developed a competence profile entitled Learning to Innovate. This profile serves as a guide for designing a teaching approach which enables students to actively develop into such professionals.

There are five crucial characteristics for designing learning environments which challenge students to master the said competence profile: a multidisciplinary issue drawn from actual practice; an authentic learning environment; professional excellence as both the aim and basis for assessment; qualified teachers setting high standards for their students; and working and learning in a Community of Learners made up of all those involved.

In this paper, we first explain the essence of an Innovation Lab or I-lab. We then present some additional considerations and various different approaches to designing a powerful learning environment like the I-Lab.

Keywords: competence profile, innovation lab, learning environment, honors

1. Introduction

Rotterdam University of Applied Sciences (RUAS) applies its competence profile *Learning to Innovate* in its excellence education. Students are encouraged to master this profile during their studies. The university has been experimenting with education in 'Innovation Labs' in order to challenge students for a number of years now. Over this period, we have discovered which ingredients we need to design and implement an Innovation Lab of this type.

Our experience has led us to identify five characteristics and develop them in conjunction with one another, producing what we now call 'effective learning environments'. These

learning environments challenge students - and their teachers - to bring out the best in themselves. The five characteristics are:

- Working on multidisciplinary, practical issues
- Creating an authentic learning environment
- Pursuing and assessing professional excellence
- Having qualified teachers with high expectations of their students
- Working and learning takes place in a work-based learning community in which all those involved (students, teachers, working practice, knowledge centers) have a part to play

The innovative nature of this educational setting forms the basis for learning. The starting point is to identify and work on a practical issue lacking a ready-made solution. It is essential that professional practice also is involved in looking for and assessing solutions.

The role of teacher takes on new features in an Innovation Lab, too. In such a setting, the teacher is not the one who knows everything: on the contrary, he or she intervenes effectively in group processes, stimulates the development of competences and assesses that development. Teachers learn along with their students when developing new knowledge.

We describe the five characteristics in more detail below and provide the necessary evidence base. Section 2 begins by explaining the essence of an I-Lab. What makes it so powerful? Section 3 presents additional considerations that we hope also will prove clarifying to readers. Section 4 describes various different approaches to designing a powerful learning environment like the I-Lab.

2. Essential components for designing an I-Lab
In 2010, we started experimenting with Innovation Labs in our honors program. We have found that the best way to describe an I-Lab is as a 'powerful learning environment' on which we based the design to follow five characteristics (Lappia-van Es, 2015, p. 226; Lappia et al., 2014, p. 22-23):
1. Working on multidisciplinary, practical issues
2. Creating an authentic learning environment
3. Pursuing and assessing professional excellence
4. Having qualified teachers with high expectations of their students
5. Working and learning takes place in a work-based learning community in which all those involved (students, teachers, working practice, knowledge centers) have a part to play.

These five characteristics will only lead to a powerful learning environment if they are all present and interrelated. No one feature can exist without the other.
We start our description of each feature with a quote from the dissertation of Josephine Lappia (Lappia-Van Es, 2015). We then explain the basic concepts and what we mean by them.

Re 1: A multidisciplinary issue drawn from actual practice

> *'An intractable multidisciplinary issue has been described that students in different disciplines can work on, where relevant in small groups – and, where relevant, with each group consisting of students at different levels of competence. The issue calls for innovation – in other words, it cannot be resolved taking a routine approach – and requires new knowledge and higher-order learning, which in turn means taking a knowledge-driven approach to solving a problem drawn from actual practice (related to knowledge creation).'*

What do we mean by 'intractable' and 'multidisciplinary', and why do these concepts represent the essence and therefore the starting point of I-Lab design?

The issue presented to the students must be intractable. What we mean is that the issue must be raw, open, complex, perhaps even hairy or slippery, making a routine approach unsuitable. By raw, open and complex, we mean that we cannot isolate aspects of the issue to make the issue easier for students to 'digest.' In other words, we cannot turn the issue into a theoretical or academic problem that allows students to practice applying a theory.

The issue presented to students should encourage multidisciplinary cooperation. What we mean is that the issue should be of genuine relevance in the world outside the I-Lab; stakeholders in the profession and in society are looking for answers, too. They need – and they have a vested interest in – new insights and new or innovative strategies.
The issue should therefore be presented in the same way that it has arisen in the profession and in society: as a complex, complicated matter, with no solutions within easy reach, seemingly unsolvable.

This approach produces an issue that requires contributions from different disciplines. Coming up with satisfactory answers is impossible without exploring the issue from differing perspectives or without applying analysis and operational models drawn from different disciplines, whether academic or professional. It takes a multidisciplinary effort and innovative approaches to find solutions.

Because the issue requires a multidisciplinary, innovative approach, it logically also involves cooperation between teachers, internal and external experts, and students majoring in different subject areas or enrolled in different study programs. Their cooperation is not about the act of cooperating itself. To explore every facet of the issue and come up with solutions or start identifying solutions, students, professionals in the field, and teachers need expertise, analysis models, operational models, skills, and forms of cooperation utilized in various different subject areas and the profession.

Exploring and coordinating the different forms of knowledge present in those disciplines, in the profession, and in research can help in the quest for answers. To arrive at innovative solutions, answers must be assessed and coordinated using different methods, for example 'idea-generating sessions' or 'scrum meetings'.

Idea-generating sessions consist of the following process: diverge, converge and interim consolidation – 'Where do we stand?' – and proceed. This process teaches the participants to learn about and utilize one another's expertise. In a scrum meeting, the back-and-forth process always takes place within the group. The idea-generating process also is suitable for individual students working on their own.

These processes offer a relatively systematic manner of bringing all the different facets to the fore. The point is to scan, explore, search for and discover new options.

Re 2: An authentic learning environment

> *'Teachers have worked with partners in the profession and researchers at a knowledge center to create a challenging learning environment for honors students. This environment calls for "situated learning," in other words learning in a context that resembles the situation in which the students will have to "learn to innovate" – it is related to the ability to function in a demand-driven system (Herrington & Oliver, 2000). An authentic learning environment requires both teachers and the honors program to be externally oriented, in other words to focus on issues and options drawn from professional practice.'*

What do we mean by 'authentic' and why is this a feature?

The word 'authentic' fleshes out the relationship with (1) 'an issue that must be of genuine relevance in the world outside the I-Lab.' By presenting students with a genuine issue, I-Lab invites cooperation as it will take place later in the world outside, as they work on a problem in a team with their colleagues and experts from multiple disciplines. Because the outside world genuinely needs answers, students also will feel challenged by and held directly accountable for the situation that they will encounter at a later stage, helping students form a clearer idea of their future profession.

An authentic, challenging learning environment develops by creating the most 'genuine' circumstances possible, circumstances that will also arise later when students are working in their profession. By most 'genuine,' we mean circumstances applicable to the following:
- urgency: stakeholders are 'waiting for answers'; it truly matters that students are searching for and finding solutions or attempting to do so because the profession has no answers yet
- commitment: those who have presented these complex issues are actively committed to the learning process
- CoP/CoL: students, teachers, knowledge centers and stakeholders from the profession and society build an alliance because they are actually all learning; working together gives rise to a Community of Practice (CoP), also known as a Community of Learners (CoL)
- shared ownership: the totality of elements listed above gives all the participants a sense of ownership; everyone feels responsible for the outcomes and for working on those outcomes as a team

An authentic, challenging learning environment requires teachers to adopt a different role and to use different interventions than a teacher in a 'traditional' classroom setting. We take

inspiration from the Triple Helix Learning Environment model because our experiments have shown how well it can work in an I-Lab setting (Blom, 2012).

The Triple Helix Learning Environment model looks like a triangle with four participants: client/profession, researcher/knowledge center, teacher, and student. The student occupies the center of the triangle. The three corners of the triangle are occupied by the client working in the profession, the researcher affiliated with a knowledge center, and the teacher. By positioning the participants this way, it becomes clear that each one operates from a different vantage point. Working from these distinct vantage points, each participant bears a different responsibility and - therefore - (should) undertake different interventions:

- The client ('company') is responsible for the value of the product or rather the professional relevance of the outcomes; the client assesses content and utility and whether the outcomes will drive progress in the field. This does not mean that the client/profession awards a mark or score for the outcomes
- The researcher is responsible for the quality, reliability and relevance of the research process that students engage in
- The teacher is responsible for supervising the learning process, or rather for seeing that the student develops the necessary competences, and for assessing that development

Together, with each one operating from his or her own vantage point, the three partners bear complementary responsibility for the quality of the student's learning and of the final product, also referred to as the 'professional product.' The interventions are also complementary, with each partner contributing his or her own expertise. Distinguishing between interventions in this manner gives students space to manage their own learning process. That is their challenge.

Figure 1. Triple Helix Learning Environment model
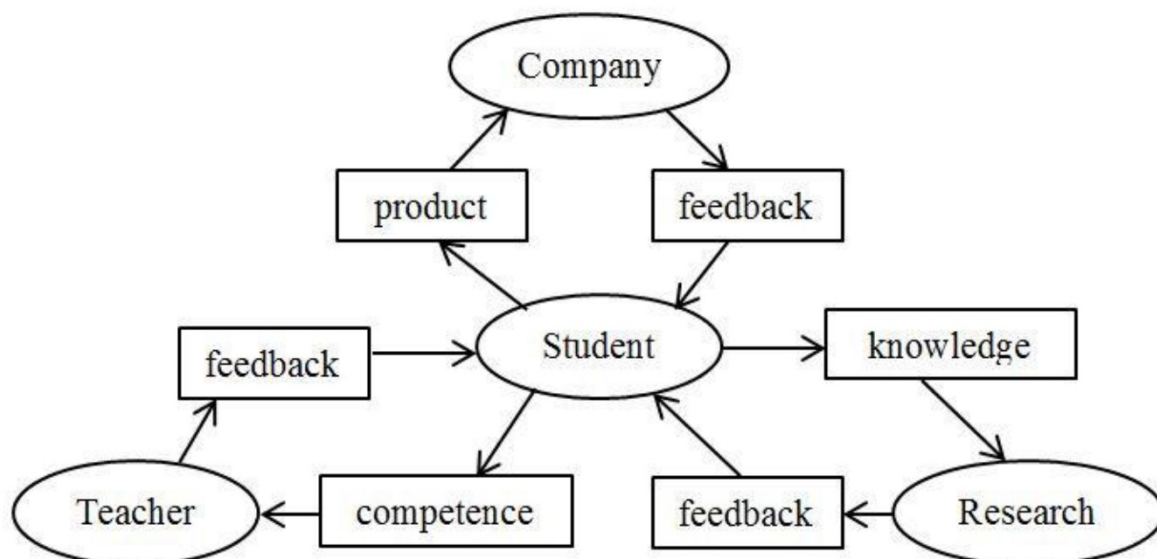
Source: Blom (2012)

We will return to the teacher's role when we discuss feature four, 'Teachers set high standards for their students,' and in Section 3.

Re 3: Professional excellence as both the aim and basis for assessment

> *'Our aim and the basis for our assessment is for students to learn to innovate by working to develop innovative solutions to problems drawn from actual practice. As a general Honors Program attainment aim, professional excellence is elaborated in the Learning to Innovate competence profile. The profile consists of five distinct but indivisible competences: being innovation-driven, being demand- driven, being cooperation-driven, being able to engage in interactive learning, and being able to generate new knowledge.'*

The relationship between a powerful learning environment and the eliciting of professional excellence.
The questions that naturally arise when working on multidisciplinary issues drawn from current practice and when creating an authentic learning environment are: Where is this taking the students? What are we actually trying to achieve? These questions bring us to the third feature, i.e. the quest to achieve professional excellence (Van Eijl et al., 2013).

As noted earlier, the RUAS Honors Program uses the five competences of the Learning to Innovate competence profile to focus the development of professional excellence. By working in an I-Lab setting, students get to work mastering the five interrelated competences of the profile and in doing so initiate and maintain their professional development. It is possible for them to do this because the five competences are reinterpreted in terms of 'role,' 'domain,' 'specification,' and then in sentences that have the following structure: 'at …, the aim is to ... so that …'

Because students initiate learning by tackling a complex multidisciplinary issue, everything revolves explicitly around their learning process and their development. Students will 'automatically' come up with such questions as:
- What will I do or what should I do?
- What will I/we investigate? What knowledge and skills do I need/are needed in this context?
- What will I learn by helping to solve this problem?
- What can I learn with and from others if I want to arrive at reliable results within a given timeframe?
- What am I learning from this about delivering reliable results, about the learning and working process that I am undertaking on my own and with others? What am I learning about my own actions? In other words, students will address the following questions: Am I doing things the right way, am I doing the right things, and am I doing things for the right reasons?

Or, as students themselves have said: 'Working in this setting has helped me discover what I'm interested in'; 'I've learned a lot by cooperating with students from other study programs'; 'I've gotten to know myself better'; 'I have a much better idea of how I see the future'; 'I now know how I can apply the knowledge and experience that I've gained.'

RUAS now offers study and career coaching to help students develop a professional identity. Because such coaching focuses on students' personal and professional development, it is also suitable in an I-Lab setting. Asking students how they relate to their future profession and to their environment kindles awareness. Once their awareness has been raised, students can make sense of what is being asked of them by putting it in their own words. Students can frame their own experiences and then manage their own learning and learning process; they assume control of their learning process.

This is what Biesta (2015) is referring to when he uses the terms 'qualification,' 'socialization' and 'subjectification'.

Re 4: Qualified teachers setting high standards for their students

> *'The learning environment described above and the issues drawn from actual practice are highly suitable for students who have the desire and ability to develop beyond what a regular Bachelor's program offers them. Honors students want challenges in the form of complex tasks and high standards, along with more autonomy and space for their own initiatives. Students and teachers have a "growth" mindset (instead of fixed mindset) (Dweck, 2010), with teachers viewing a practice-based honors program as a means to encourage students to develop above-average ability, creativity and task commitment.*
> *Motivation is the main recruitment and selection criterion for honors students. Teachers seek teaching strategies that will induce problem ownership and commitment among honors students.'*

What do we mean by setting high standards and why are they necessary for development?

It is not possible for students to work on multidisciplinary issues in an authentic learning environment with the aim of attaining professional excellence without teachers setting high standards for them. As we all know, telling people often enough that they are incompetent and not encouraging them to work on mastering a skill will undermine their confidence in themselves.

Setting high standards and exuding confidence in students' ability to meet those standards are therefore essential components of a powerful learning environment. They cannot be viewed separately from creating challenging learning environments in which students are truly able to show that they deserve the confidence placed in them. That is how students can gain 'self-efficacy.' Setting high standards also cannot be viewed separately from encouraging students to take charge of their own learning processes.

The essence of all this lies in combining the two vantage points mentioned: 'You are willing and able, or you will want to be able.'

The first criterion for inducing this process is for teachers to deploy reflection in their coaching. The second criterion is to turn compiling a portfolio into a meaningful

development exercise. The third criterion is for teachers to be aware of their role in the Triple Helix Learning Environment – and to act accordingly.

Teachers who design and work in powerful learning environments must have or develop the 'open mindset' described by Dweck (2010). An open mindset starts by identifying and learning to recognize one's own prejudices. This makes it possible to discern differences between students and to learn how to deal with them. Important questions in that context are 'What should I, as the teacher, do to teach this student how to take charge of his or her own learning?' 'What pedagogical skills must I, as a teacher, master so that I can apply them flexibly to support students' learning processes and development?' What is remarkable is that an open mindset leads, almost automatically, to inclusive education.

Students who choose to enroll in honors programs tend to have the following personality traits (albeit in latent form): above average ability, creativity, and task commitment. By enrolling in an honors program, students call on these traits and make them manifest. As Renzulli (2012) and Scager et al. (2012) have shown, one factor is that these three traits need to be present in relatively equal measure. It is up to teachers to have the knowledge and skill to recognize these traits in students. What challenges will a student then face and what type of supervision or coaching will he or she need to meet those challenges?

Re 5: Working and learning in a Community of Learners made up of all those involved

> *'Because the supervision method places considerable emphasis on student autonomy and self-guided learning, it is very important for students and teachers to build a relationship (of trust) and become a close-knit community; this proposition is supported by the theory of the authentic learning environment and situated learning (Herrington & Oliver, 2000) and by Deci and Ryan's Self Determination Theory (SDT) (2002). Communities of Learners are an important part of an authentic learning environment and act as a gateway to the various "Communities of Practice" (Wenger, 2009; Lave, 1991) that students will enter after graduation as subject specialists and as resilient and innovative professionals.'*

What do we mean by Communities of Learners and what are their crucial elements?

The fifth feature, an I-Lab Community of Learners, brings us full circle: if learning commences when students tackle an intractable issue drawn from current practice in an authentic learning environment with the aim of developing professional excellence and in which they must meet high standards, then a 'temporary' community will arise in which students, teachers, researchers and professionals learn and work together. We refer here to the term 'experiential learning' and the associated learning cycle (Hargreaves & Fullan, 2012; Kreber, 2001).

All those involved band together in a Community of Learners (CoL), sometimes known as a Community of Practice (CoP). Elements crucial to creating a CoL that functions as it should (Andringa, 2014. Lave, 1991, Wenger, 2009) are the following:
- a common cause; an urgency felt by all participants, a problem drawn from current practice that all view as intractable, and the need and desire to solve it

- the realization that no routine answers are possible; the problem genuinely requires innovation, not improvement
- the participants themselves help determine the way forward

Before a CoL commences, the participants should consider the following steps:
- Make clear what the community is about, that you as Learners will be embarking on a journey together, that the itinerary is not fixed and neither is the destination, that you will be involved in a process of seeking and learning that can easily go off in any direction if there are no guideposts, and that guideposts can serve to mark out the domain. Issues are worth the effort if they have the potential to spur people into action
- The more urgent the issue, the better
- When assembling a group of students, teachers, researchers/research coordinators and professionals, make sure that the various participants possess or can call on the expert input needed to find answers
- Consider knock-on effects, in other words: one group finishes but the problem cannot yet be solved, so the next group continues working on it
- Support development, be aware of the distinction between overseeing the subject matter and overseeing the working and learning process; carve out space to let go of patterns of thinking, to generate trust, to ask questions
- The group is responsible; the focus is on the group's target and, following on from this, on the individual and group learning processes
- Reflect: Are we still doing the right things? Are we still working to achieve our target? Take time to create a learning history document
- Do new things; a CoL focuses on learning to innovate. Learning and innovation are cyclical processes that occur simultaneously in individuals, in groups, and within and between organizations
- Make the time and effort to list the results and publicize them

3. Considerations and additional information

Readers will have noticed various recurring concepts in this text. In this section, we attempt to explain some of these concepts or topics in more detail. The considerations and additional information are meant to help teachers design powerful learning environments.

Our experience has shown us that combining the five characteristics with the Learning to Innovate competence profile can indeed produce powerful learning environments.

Thoughts on 'innovating'
The word 'innovating' evokes many different images. What do we actually want from students when we ask them to innovate? Are we expecting them to come up with an entirely new answer that no one has thought of before? Do we want new forms of knowledge? Are we asking for a new approach, in other words a new working process leading to innovation? Do we want their personal and/or professional development? Or are we asking for all of these combined? We believe it is the latter, and research and the literature appear to support our view.

For her PhD, Suzanne Verdonschot (2009) studied what produces breakthroughs in innovation practices. She approached the subject from the perspective of the 'profession,' not that of education. In her study, she identifies eleven 'design principles' on which innovation is conditional:
- Formulate an urgent and intriguing question
- Create a new approach
- Work from individual motivation
- Make unusual combinations of subject matter expertise
- Work from mutual attractiveness
- Build on strength
- Create something together
- Entice [students] to see new signals and to give them new meaning
- Connect the world inside the innovation practice to the world outside
- Pay attention to the social and communicative process
- Actively support the development of competences

What is noticeable about these design principles is that, when we approach innovation from the perspective of 'the profession,' then the issue itself turns out to be essential; it provides inspiration, it motivates, it acts as a driver.

Besides connecting the world inside and the world outside innovation practice, another striking design principle is to make use of unusual combinations of subject matter expertise.

The foregoing principles reappear in some of the five characteristics for designing powerful learning environments, although different wording is used: formulate an urgent and intriguing question; make use of (provide) unusual combinations of subject matter expertise; connect the world inside… with the world outside.

The foregoing in fact also applies to George Couros' 'Innovator's Mindset' (2014), which we elaborate on below (see figure 2). Couros identifies eight characteristics of the Innovator's Mindset:
- Empathetic   putting ourselves in another's shoes
- Problem Finder   asking good questions instead of simply asking for answers
- Risk Taker   going off the beaten path – trial and error
- Networked   being connected – sharing ideas leads to better solutions
- Observant   looking around – recognizing and creating connections
- Creator   turning ideas into action
- Resilient   persevering when things don't work on the first try
- Reflective   looking back and looking ahead

Interestingly, these eight characteristics run parallel with concepts used in RUAS's description of the 'Learning to Innovate' competence profile.

Figure 2. Eight characteristics of the Innovator's mindset

Source: http://georgecouros.ca/blog/archives/4783
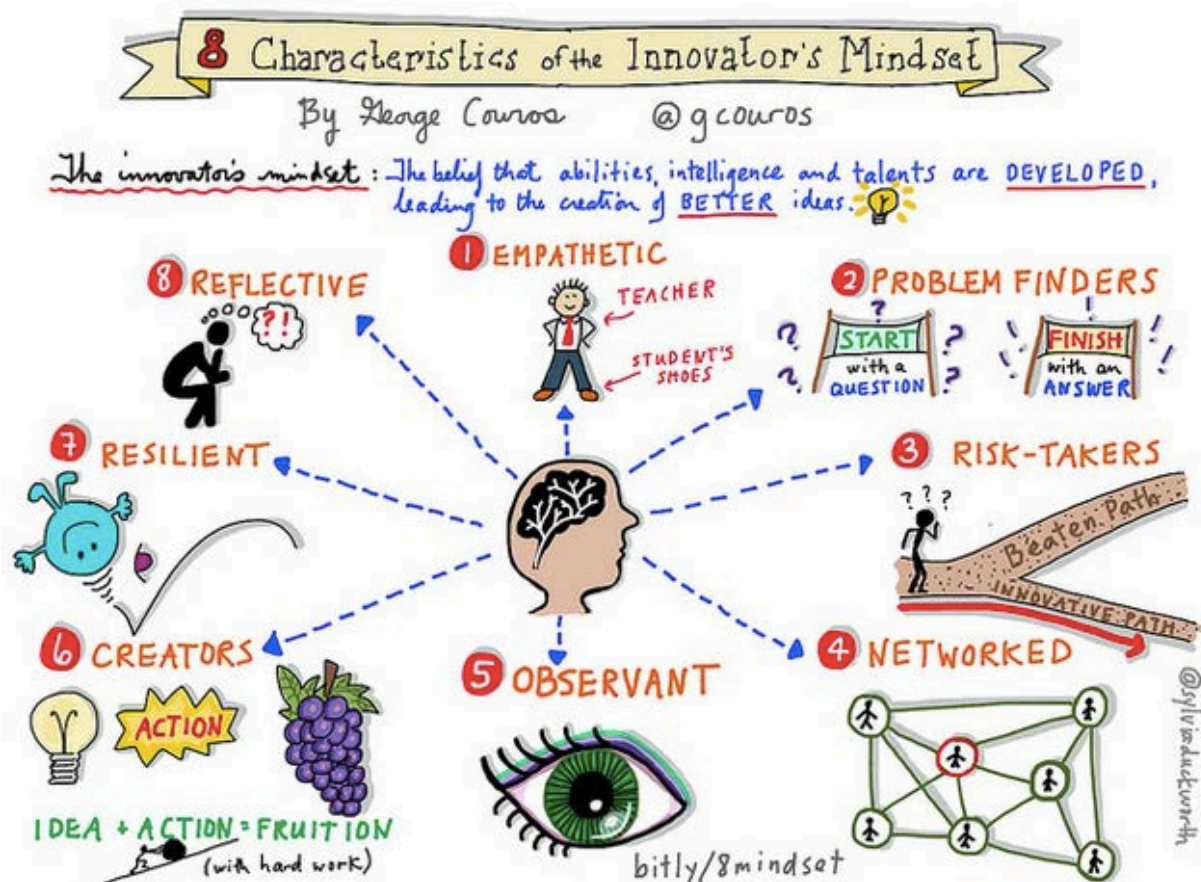
Peter Oeij (2017) received his doctorate for his research on 'Resilient Innovation Teams.' The main question that he addresses is: What typifies project teams that exhibit innovative behavior? In his study, he focuses on team behavior. What repertoire of actions is needed during critical incidents; in other words when a routine approach is not enough? How can teams improve the success of their innovations?

Oeij - too - arrives at a number of traits that he refers to as 'innovation resilience behavior':
a.   to be alert of 'weak signals'
b.   to resist oversimplification by suggesting valid alternatives
c.   to remain sensitive to what is done in the projects, why and for whom
d.   to be able to change course when needed
e.   to defer to expertise
f.   to monitor vigilantly what the team does
g.   to brief and debrief decision making during the project
h.   to reflect and organize feedback loops in order to learn from what the team does

These traits are backed up by organizational conditions for innovation resilience behavior: team psychological safety, to allow team members to make mistakes; team learning, i.e. a team climate that encourages experimentation; team voice, i.e. all team members have a say in decision-making; and complexity leadership, i.e. leaders who can reconcile possibly opposing views.

Finally, Oeij developed various instruments to analyze 'innovative behavior' and track down obstacles.

Here – too - we recognize a number of concepts that also play an important role in learning to innovate: '…consider valid alternatives; allow mistakes; leave room for experimentation; defer to expertise.'

Thoughts on reflection and the role of the portfolio
Reflection is not always very popular in higher professional education. Too often, students are asked to reflect during the course of a year without having gained enough practical and learning experience to reflect on. If reflection is then not followed up by meaningful and instructive discussion, students are likely to resist. In short, one could say that we are ourselves to blame for such fierce student resistance.

And yet, we know that reflecting on experiences, and especially on experiences in profession-critical situations, can help students engage in explicit learning and encourage them to manage their own learning process. By engaging a student in a dialogue about his or her profession-critical experiences, we can trace learning moments that may have initially escaped the student's notice. Asking questions – sometimes specific questions – plays an important role in this.

By reflecting, both one-on-one and in a group, students learn to ask themselves such questions as:
- Have I/have we done the right things?
- Have I/have we done things the right way?
- Have I/have we done things for the right reasons, considered the right factors with regard to ethical aspects, accountability to society, financial prerequisites, …?

Reflection should include these three aspects.

We can take reflection full circle by asking students what reviewing the foregoing three aspects has taught them about their own development and how much progress they think they have made:
- What have you learned about yourself?
- What have you discovered about your strengths and weaknesses?
- What have you learned about your efforts?
- What have you learned about your role in the team, your contribution to the process itself, and about developing your expertise?
- What will you do with that information?

Taking reflection full circle makes it meaningful and effective for students.

Reflecting on practical and learning experiences helps students develop their own ideas about what their future profession will require of them. Nowadays, we refer to this as 'professional identity' (HR, 2016a). By encouraging professional identity in students, we are addressing such questions as 'Who are they as people?' 'What do they want to learn?' and 'How do they wish to relate to their profession and environment?' Students need to engage in the process of reflection so as to make conscious choices in learning, to take charge of

their own learning process, and to make the transition from 'study coaching' to 'career coaching.'

Keeping a logbook and compiling a portfolio are activities that support reflection and the students' transition to career coaching. They help students become aware of what they are working towards and what they must learn and master to get there and support them in developing their own initiatives. In this context, the portfolio becomes a development instrument in which students collect experiences, reflect systematically (for example using the STARR model) and are given feedback in dialogue with fellow students, supervising teachers and external parties.

Students will only be prepared to pour energy into assembling a portfolio if that dialogue turns out to be useful for their own development. The best and most effective form of 'development portfolio' will need to be identified for each 'professional practice.' In the Honors Program, the portfolio can easily be used at the end of the course for purposes of final assessment.

Thoughts about the need for teacher expertise in an I-Lab setting
'The teacher makes the difference.' We can tinker around with all sorts of factors, but research has once again shown that the teacher's pedagogical expertise is and remains the decisive factor in student learning.

Designing an I-Lab requires teachers to have expertise in relation to at least three features:
- determining the suitability of issues
- supervising and intervening in group processes and maintaining high standards
- supervising, coaching and assessing student competence development

Teachers need not all be experts in 'everything.' Those assembling teaching teams can also ensure that the team as a whole possesses different forms of expertise. That way teachers can complement and even learn from one another.

Teachers must be capable of determining the suitability of a particular issue, in any case with respect to the characteristics 'multidisciplinary,' 'professional excellence' and 'Community of Learners.'

For teachers to determine an issue's suitability requires them to discuss the role that the external partner or client plays in an I-Lab. The involvement of external partners plays an important role in the exploration of an issue and the space that students need to do so. Experience shows that external partners and experts are prepared to play a role in I-Lab settings.

Teachers must also be capable of designing and supervising learning/working processes, for example 'idea-generating sessions' – processes in which students master the art of diverging and converging. Becoming skilled at this type of method encourages students to be active, to explore, to feel confident, to take risks and to take responsibility.

Teachers need to be or become skilled at knowing 'when and when not to intervene in group incidents,' 'when and when not to intervene in a group process,' 'when and when not to step

back,' 'when to take the time to analyze a group process with students from different vantage points.'

When teachers intervene, they should always ask themselves 'What is this teaching us about our approach, our team, and ourselves? What do we need to go forward, in terms of subject matter, processes and as individuals?' By engaging in this manner, teachers build their own expertise.

When it comes to encouraging student competence development, the skills toolbox should also include supervisory skills. What sorts of questions and which interventions encourage students to learn? How can teacher and student have a dialogue about entries in a portfolio? How do you foster 'explicit' learning in students? The teacher's role as 'competence supervisor' requires these skills. Another necessary skill is the ability to give feedback at differing levels of reflection (Korthagen & Vasalos, 2005).

In terms of subject matter, teachers should exercise restraint in two different ways. On the one hand, no one can be an expert at everything; on the other, students need to take the initiative in calling on teachers' and external partners' expertise. What is important, however, is for teachers to recognize when students get stuck and to intervene when they suspect that students are 'oversimplifying.' The SOLO taxonomy may be useful in this regard; it focuses on the concept of 'complexity' and offers a convenient way of thinking about it.

Thoughts on 'testing'
Students generally participate in I-Labs in their seventh semester, i.e. the first six months of their fourth year of study. In theory, they can enroll in an I-Lab at an earlier point in their study program – when these are referred to as 'Try-Labs' – and in any year. The question is how to proceed with testing in a way that assesses individual student achievement.

In higher professional education, students work on a graduation project in which they are required to address the aspects 'context,' 'task,' 'independence' and 'innovation.' The level of complexity of these four aspects and the extent to which students show themselves capable of developing, taking and maintaining control over them gives us a yardstick for determining and assessing the 'quality' of this final project. In terms of 'innovation,' RUAS assesses the 'professional product' that the student produces as either an 'improvement,' a 'change,' a 'renewal' or a 'discovery.' To obtain a Bachelor's degree, students must deliver a product that is at least an 'improvement.' In the Honors Program, they must, at the very least, produce a 'renewal' and preferably a 'discovery.'

We test and assess students using the Learning to Innovate competence profile. We also make use of the Higher Professional Education Graduation protocol and apply various taxonomies to ensure that our testing is satisfactory, valid and reliable. What we aim to assess is how students work in teams on complex issues (drawn from practice). That means that we are obliged to assess four aspects:
- the quality of the outcomes of the student's work; once again, we refer here to the Triple Helix Environment Model: external partners and researchers play a key role in this

- the student's contribution to the working process and group process; supervising teachers and fellow students play a role in this
- the student's individual contribution to the outcomes; supervising teachers and fellow students play a role in this
- the student's individual development: is the student demonstrating an ability to reflect on his/her own actions
    - in relation to the subject matter?
    - in relation to the working and group process?
    - in terms of his/her own and others' actions in that process?
    - in relation to his/her own growth and ambitions?

We base our assessment on the behavioral elements of the Learning to Innovate competence profile (HR, 2016b).

As we noted earlier, we use the Learning to Innovate competence profile as a basis for designing honors education. The five competences featured in the profile have been broken down into behavioral elements. These elements offer guidelines for giving students effective feedback and feedforward. On that basis, students can then set learning and development goals for themselves. We also use level indicators that show, for each competence, the impact that the student's behavior has had on every aspect of the learning process.

This assessment method can be keyed to the student's current year of study. Step by step, and specifically by means of planned dialogues, students can be guided to 'taking charge' of their own learning process. Be aware, however, that each student progresses at his or her own pace.

Where necessary, feedback can be converted into a grade or assessment.

4. Approaches to designing powerful learning environments

We can commence the design process leading to a powerful learning environment such as the I-Lab from a variety of different starting points. We have identified three:
1. Start the design process by addressing a topical issue that has been presented by one or more external partners
2. Start the design process by addressing an issue that you, the designers, have identified. It should be a topical issue in society and/or business but does not come directly from an external partner
3. Combine the above two

The next step is to list the concerns that play an important role in the design process. These concerns should reflect the five characteristics.

Re 1: Designing based on an issue presented by external partners (be over-prepared)
- Explore this issue by immersing yourself in it and by assessing the potential that it offers your students for learning: does it evoke a multidisciplinary setting, is it challenging, complex, intractable? Consider which study programs could play a role
- Discuss the present state of the issue with your external partner or partners – what are the precise questions that need addressing, what innovations are currently under

way in this area, what experiments are already taking place, what opportunities are there – so that you are fully prepared as a teacher and can ask your students challenging questions that will get them and keep them working

- Discuss your external partner's/partners' expectations with regard to his/ her/their role or tasks, as well as their expectations of the other I-Lab participants
- Prepare the authentic learning environment by searching more widely for experts, for example among research coordinators and expertise centers. It is not your job to ensure that the external partners will in fact participate; that is the job of the participating students. However, it does help teachers to know what types of experts will need to be consulted
- Prepare yourself as a teacher by considering what 'professional excellence' means in this setting. Consider which versions of professional excellence might emerge. This step is not meant to be exhaustive but to expand the way you think about opportunities and potential: What can you expect and how will you deal with it? At the same time, you should recognize how this corresponds to setting high standards and the necessary development of/ evolution towards an 'open mindset'
- Imagine all the many things that could happen working in a CoL. Doing so will allow you to explore in advance which interventions might be necessary and to deliberately address the question of when and when not to intervene, so that you can concentrate on getting the students to take charge
- Prepare tests that allow for potential differences that may arise between students. Make sure that those differences are acknowledged and discussed and see that testing and assessment take account of these differences

Re 2: Designing based on an issue that you, the designers, have identified
There are topical issues in society and/or business that have yet to be addressed. They must be tackled because they are expected to require new answers and new solutions; examples include issues related to energy, the environment, social inclusion or the growing level of income inequality.
Producing a design based on an open issue of this kind requires you to start off differently:
- Begin by exploring the issue from every angle as designers so that you know what it entails and which external parties and experts in society and/ or the business sector will be affected by it. For whom is this an urgent issue?
- If your exploration reveals that it is indeed a multidisciplinary, complex and intractable issue that external partners can commit to, then follow the design process described above

Re 3: Designing based on a combination of the two
It is also possible that an external partner will come to you with a question that is very open-ended. For example, in one partnership, a hospital has presented us with the same question for several years in succession: 'We're an innovative hospital. What can or must we do to remain innovative?'

We submitted this question to our students and challenged them to come up with ideas and designs and to find external partners themselves. In this case, teachers should focus on coaching students and encouraging them to seek out 'just-in-time' knowledge.

Whichever perspective applies, the fact is that the preparation process is crucial to powerful and effective implementation!

5. Conclusion

The RUAS Honors Program aims to encourage students to develop into excellent professionals. To do so, RUAS has developed a competence profile entitled Learning to Innovate. This profile serves as a guide for designing a teaching approach which enables students to actively develop into such professionals.

There are five crucial characteristics for designing learning environments which challenge students to master the said competence profile, as demonstrated by experiments which led to PhD research of Josephine Lappia (Lappia-Van Es, 2015).

We have led you, the reader, past these five characteristics by means of a guide. We stopped to consider various perspectives and key issues along the way, all of which will help you as an education designer as you reflect on and design a teaching approach such as an Innovation Lab.

Acknowledgements

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Paper

Implementing theory in the design of a professional development course for honors teachers: A Teacher's Road to Excellence

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Abstract
Teacher development courses should be based on both research and literature to promote their success and impact in practice. In this article, we translate the findings of research studies and theories into evidence-based design principles for a professional development course for honors teachers. This course was evaluated on the level of teacher reaction, teacher learning, outcomes, and organizational response. Nine design principles were formulated and translated into concrete actions, resulting in a one-year course (study load of 140 hours), 'A Teacher's Road to Excellence.' We evaluated the impact of the course with a questionnaire filled in by participants (N=10) who finished the course one year ago. The design principles showed to be helpful in developing this course for honors teachers. The course, 'A Teacher's Road to Excellence,' seems to be instructive for honors teachers and impact on student learning outcomes is seen. More research is needed to improve its impact further, on organizational level.

Keywords: Professional development; teacher training; honors teaching; evaluation; impact on practice

1. Introduction
Teachers educating gifted and talented students, as, for example, in honors education, express a need for training (Reis & Renzulli, 2010). It is important to meet this need because, as National Collegiate Honors Council stated, the key to a successful honors program is not the intelligence of the student or the subject matter of the course but the attitude and approach of the instructor (NCHC, 2012). Professional development courses specifically for teachers educating talented and gifted honors students are slowly upcoming (Wolfensberger,

2015). According to review studies of Van Veen, Zwart, Meirink & Verloop (2010; 2012) and, more recently, from Merchie, Tuytens, Devos & Vanderlinde (2016), successful professionalization activities – that have impact on teaching in practice – have several characteristics. When developing a professional development course, teacher educators should take these characteristics into consideration. In this article we:

1. translate the findings of research studies and theories into evidence-based design principles for a professional development course for honors teachers
2. use these design principles to develop a course
3. evaluate the impact of this course on it participants

2. Professional development for teachers

Teacher professional development in the educational context is designed specifically to enhance the knowledge, attitudes, and learning behaviors of teachers to bring 1) changes in the classroom practice of teachers, 2) changes in their attitudes and beliefs, and 3) changes in the learning outcome of students (Van Veen et al., 2010; Guskey, 2000). If a teacher does not value a certain strategy very highly, this strategy will probably not be used regularly by this teacher. According to Guskey (2000; 2002), two factors influence whether a professional development activity results in changes in practice: 1) what motivates teachers to engage in professional development and 2) the process by which change in teachers typically occurs. This process of teacher changes can be expressed in the 'Model of teacher change' Guskey (2002) developed (figure 1).

Figure 1. Model of teacher change
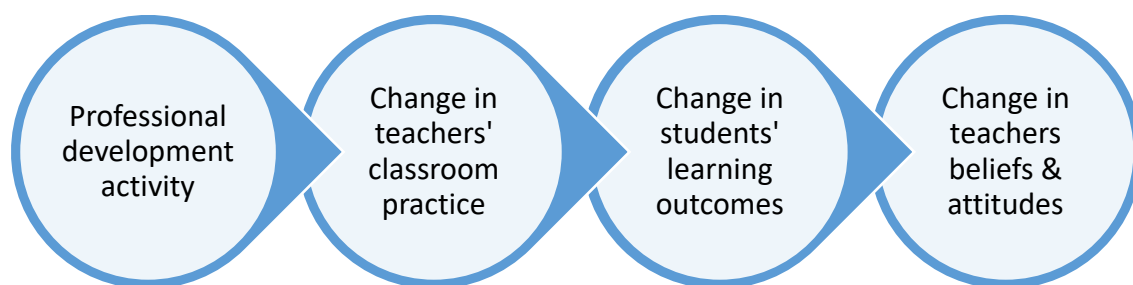
Source: Guskey, 2002

Important in this model is that changes in teachers' beliefs and attitudes do not occur by just following a course but because of the teachers' experiences with the new knowledge and strategies in practice. The teachers believe something works when they have seen it work with their students. A professional development activity should therefore not only aim at the development of a specific set of teaching strategies but also on (changing) the underlying beliefs that regulate these strategies. Taking this principle into account, several design principles that serves as guidelines can be formulated.

3. Design principles for a professional development course
Successful professionalization activities have a focus on content and pedagogy closely linked to practice (Principle 1) (Van Veen et al., 2010; Merchie et al., 2016; Guskey & Yoon, 2009; Villegas-Reimers, 2003). The content of educational programs is related to the specific context in which the teacher works. This context might be specialist knowledge concerning the discipline or specific pedagogies and teaching behaviors.

Professionalization activities should be aligned with participants' personal learning objectives, problems experienced in practice, and personal interests (Principle 2) (Van Veen et al., 2010; Merchie et al., 2016; Korthagen, 2017; Fullan, 2006; Villegas-Reimers, 2003). Personal qualities and ideals should be the starting point of teacher development activities (Korthagen, 2017). By continuing to align the content and program to the participants' needs, and by adapting and adjusting the program if needed, participants will become co-owners of the process (Merchie et al., 2016; Guskey, 2002). This co-ownership will positively influence the teachers' intrinsic motivation (Ryan & Deci, 2000).

Professional development activities have to be consistent with research and have an evidence-based design of the programs (Principle 3) (Merchie et al, 2016; Van Veen et al., 2010). The methods chosen should be based on research; for example, using the last class to stimulate reflection and evaluation (Bleicher, 2011). In addition, the effects of professional development activities on the teaching practice and the student learning should be followed by systematic evaluations. This evaluative research provides knowledge to make evidence-based decisions when improving the professional development program. This reflection should include clear argumentation on how the professional development activity is expected to influence teacher behavior and student learning (Van Veen et al., 2010; Guskey, 2002).

To really be able to see changes in their students (Guskey, 2002), teachers should receive room to experiment in practice and follow these experiments systematically with research (Principle 4). Experimenting in practice, evaluating the effects, and sharing these experiences should be an important part of all professional development activities, especially in honors. Conducting educational research (this can be design based, explorative, or evaluative) by teachers appears to be one of the most fruitful forms of teacher professional development (OECD, 2009; Brydon-Miller et al., 2003). Research conducted by teachers also functions as a bridge between theory and practice (Blumenreich & Falk, 2006; Brydon-Miller, Greenwood & Maguire, 2003). This research adds to the call for more evidence-based education (Onderwijsraad, 2006) and promotes sharing educational knowledge (Bosker, 2008). Furthermore, it also contributes to improving the quality of education. For honors education, this is especially important, as one of its functions is to be a 'laboratory' for educational innovations (Wolfensberger, Van Eijl & Pilot, 2012).

The quality of trainers also plays an important role in the success of training programs (Merchie et al., 2016). Trainers should have knowledge of adult learning theory and have experience in teaching students and training professionals (Principle 5). Trainers of teachers should have knowledge about adult learning theory. They must be able to articulate experiences and use theory in practice. They have to stimulate active learning and be able to reflect on their own choices and teaching behaviors. Teacher trainers also have to deal with

dilemmas during training sessions and discussions and therefore need a solid knowledge base and skills in addition to experiences in the teaching practice the teachers are from (Lunenberg, Dengerink & Korthagen, 2013). In our case, this experience is in teaching honors students. The trainers and coaches within professional activities need to be well-educated and involved in education.

Trainers of professionalization activities should also serve as role model (Principle 6). The teacher trainers in the professional development activities have a complex dual role. Not only do they teach the teachers, but they also teach about teaching (Lunenberg, Korthagen & Swennen, 2007; Korthagen, Loughran & Lunenberg, 2005). Trainers should be aware of this function both in terms of the teaching methods and didactics used and the content and learning goals. Participants should receive concrete examples of working methods they can apply directly in their honors programs. Trainers should therefore make explicit which choices they make while teaching and why (Wood & Geddis, 1999). As Blume (1971) stated: "Teachers teach as they are taught, and not as they are taught to teach."

Professional development of teachers is more effective when the teachers actively construct knowledge and learn together with colleagues (Principle 7) (Van Veen et al, 2010; Darling-Hammond & Richardson, 2009; Villegas-Reimers, 2003). By sharing knowledge and experience, giving each other feedback, and looking at knowledge by using varying perspectives, the teacher group will jointly construct knowledge strongly influenced by the context in which it will be applied (Webster-Wright, 2009; Van Veen et al., 2010). Knowledge is not presented as fact, but it rather begins with a problem or an issue about which the participants do research, discuss, debate, and thus achieve self-constructed knowledge (Dostal, 2015). These discussions also provide information to the trainers regarding which knowledge and skills are needed to further improve the teaching in practice of the participants (Van Veen et al., 2010).

Furthermore, attention should be paid to student perspectives and student input (Principle 8). Students are the ones who are to be taught by the teachers who are being trained. Integrating student views and experiences can bring significant added value to professional development programs, something which is currently lacking in most professional development activities (Margolis, Durbin, & Doring, 2016). Making time to listen to students and their experiences and needs helps teachers to reflect on their teaching behaviors and attitudes.

To be effective, a combination of intensive and extensive programs is needed (Principle 9) (Merchie et al., 2016; Guskey & Yoon, 2009). There is no clear requirement as to how many hours these programs should take, but a minimum of 20 contact hours is recommended (Merchie et al., 2016). Also, a continuing support system in the form of follow-up sessions is highly recommended. Isolated workshops seem to be less effective (Mouza, 2002). However, workshops can be used as a stepping stone to more long-term professionalization activities. Regular follow-up support is seen as indispensable for the change process (Merchie et al., 2016).

Table 1. Design principles for professionalization activities, based on research

Principle 1: Focus on content and pedagogy closely linked to practice
Principle 2: Aligned with participants' learning objectives, problems, and personal interests
Principle 3: Evidence-based design followed by research
Principle 4: Room to experiment in practice and research the effects
Principle 5: Trainers have knowledge of adult learning and experience in teaching
Principle 6: Trainers serve as role models
Principle 7: Focus on active construction of knowledge and learning together
Principle 8: Attention to the student perspectives and student input
Principle 9: Intensive and extensive programs combined

In this article, we describe how we translated these design principles into a course for honors teachers and the impact of the course on one group of participants.

4. Method
Context
Based on the design principles shown in table 1, a one-year course for honors teachers was developed at Hanze University of Applied Sciences in Groningen, The Netherlands: 'A Teacher's Road to Excellence.' Learning objectives of this course are formulated as follows: *By the end of this course, participants will be able to: 1) formulate their own views on honors students and honors education, 2) improve or enhance their own teaching strategies in honors education, 3) strengthen their knowledge, attitude, and teaching behavior regarding honors, 4) test, review, and adjust their own teaching behavior, 5) strengthen the honors learning environment in their own teaching practice, and 6) expand their honors network within the Hanze University of Applied Sciences.*

Participants and procedure
We first consider the course itself. Then, we evaluate the impact of the course based on a questionnaire filled in by a group of participants (N=10) who followed the course from September 2016 until July 2017. In the last session, the course was evaluated orally. To indicate the impact on the course after some time working in practice, participants were also asked to fill in a short questionnaire in April 2018, almost one year after finishing the course.

Questionnaire
To evaluate the impact of the course on several levels, we used the questionnaire developed by McChesney & Aldridge (2018) consisting of twelve questions divided into four scales: 'teacher reaction,' 'teacher learning,' 'outcomes,' and 'organizational response.' Each scale consists of two or four items which could be answered on a 5-points Likert scale (1= Strongly disagree; 2= Disagree; 3= Neutral; 4=Agree; 5=Strongly agree). The questionnaire was translated using back translation. Participants were asked by email to fill in this short questionnaire.

5. Results
The course
The course was developed in 2012-2013 to better prepare teachers to educate honors students. Until now, 5 groups of participants followed the course. Each group consists of 10-

13 participants. Table 2 shows how the different design principles are translated into practice for the course 'A Teacher's Road to Excellence' (ATRE).

Table 2. Design Principles and the translation to practice

Principle	Practice
1. Focus on content and pedagogy closely linked to practice	Content is centered on the three dimensions of honors teaching approaches (Wolfensberger, 2012); meetings in schools of the participants
2. Aligned with participants' learning objectives, problems, and interests	Intake interview; 24-hour meeting to start; COP-meetings; partly open and adaptive program
3. Evidence-based design followed by research	Activities as far as possible supported by literature and evidence; evaluation of the course on short and long term
4. Room to experiment in practice and research the effects	Research project in participants' own practice
5. Trainers have knowledge of adult learning and experience in teaching	Well-educated team of trainers with experience in honors teaching, consultation of experts
6. Trainers serve as role models	Translation of the activities to participants' practice; trainers use honors pedagogy in organization and facilitation
7. Focus on active construction of knowledge and learning together	COP-meetings; discussions with students; presentations and abstract bundle at closing symposium
8. Attention to the student perspectives and student input	Student present at 24-hour meeting, 2 formal meetings and closing symposium
9. Intensive and extensive programs combined	One-school year; follow-up meetings and masterclasses

Before the start: In order to attend the course, participants were invited to write an application letter, accompanied by a letter of recommendation written by their supervisor. During an intake interview, the participant's motivation and reasons to take part in the course, as well as their individual learning needs and questions, were explored (Principle 2).

Outline: The course lasts one academic year, from September to July (Principle 9), consisting in total of 140 study hours. The content of the course was centered on the three dimensions of honors teaching approaches (Wolfensberger, 2012): academic competence, bounded freedom, and community (Principle 1), complemented with subjects that were included in order to meet the specific learning goals of the participating teachers (Principle 2). So, part of the course was preformatted and part of the course was adapted to meet the learning goals of the participants. The course consists of a meeting lasting 24 hours, four formal one-day meetings, five community of practice meetings (COPs), a research project, and a closing symposium (see figure 2).

Figure 2. Time schedule ATRE*

Intake	24 hour meeting	Meeting 1 Community	Meeting 2 Academic Competence	Meeting 3 Bounded Freedom	Meeting 4 Open	Symposium
		COP** 1	COP 2	COP 3	COP 4	COP 5
	Research project					

*ATRE: A Teacher's Road to Excellence; **COP: Community of Practice meeting

During the *24 hour meeting* participants get to know each other and the trainers. Activities in this session aim to build a community of honors teachers. Furthermore, the three dimensions of honors teaching approaches are discussed (Principle 1), participants' current learning objectives, personal interests, and problems are expressed (Principle 2), and all participants are stimulated to think about a research project they will perform during the course (Principle 4). Students are present during the first day and dinner to discuss with the teachers their vision of honors and honors teaching and to pitch their personal journeys in honors so far (Principle 7).

The 24 hour session is followed by four formal *meetings*, eight hours each, during the academic year. The formal one-day meetings are being held in the school of one of the participants; a tour through the school is included into the program (Principle 1). Three meetings concentrate on a main theme: community building, academic competence, or bounded freedom. During the meetings concerning community building and bounded freedom, honors students are joining the meetings during several activities (Principle 6 & 7). The last formal meeting is focused on subjects the participants come up with during the course. These can be subjects they miss in the program or subjects they want to deepen further with an expert (Principle 2 & 6).

In between the formal meetings, five *Community of Practice* (COP) meetings are scheduled in consultation with the participants. A COP is a meeting with a smaller group of participants and one of the trainers as moderator. During these meetings, participants define the content of the program, and there is room for sharing knowledge and experience, giving each other feedback, and jointly constructing knowledge (Principle 6).

During the course, participants perform a *research study* in their own practice. This research study must be theoretically sound, relevant for teachers' own teaching practice, and aiming to improve education for honors students (Principle 4). Participants consult trainers and the research expert when they need to. They describe their research project, the literature used, and the results in an abstract. The abstracts are bundled and handed out during the closing symposium (Principle 6).

The final meeting of the course is a symposium during which the teachers present their research study and most valuable learning outcomes to colleagues and other interested people (Principle 6).

Activities: The activities used in the program are supported by literature and empirical research as much as possible (Principle 3). Examples include using Lego serious play to develop and share ideas (Peabody & Noyes, 2017) and using the last class to promote reflection and evaluation (Bleicher, 2011). The activities used in the course are also translated to the participants' practice: the honors program with students. So, participants can apply the activities directly to their honors program and the trainers fulfill a role model function in this (Principle 5).

Trainers: The trainers of the course use the honors didactics in the organization and facilitation of the course (Principle 5). The group of trainers consists of one or two main trainers who are experienced teacher trainers as well as experienced honors coaches. Experts concerning research, coaching, and academic competence are consulted and perform as trainer during the course when required (Principle 8).

After finishing the course: The morning before the closing symposium is used to evaluate the course and reflect on participants' own learning during the course. Also, a longer time after the course (1-3 years), participants will be asked if and how they use what was learned during the course in their teaching practice (Principle 3). Follow up meetings and masterclasses are being organized for alumni of the course.

Evaluation

During the oral end-evaluation of the course, participants indicated that they liked the different work formats that were used during the course, and they were able to implement these formats in their own honors courses. They were very positive about the sharing of knowledge and experiences and felt they became a community of learners together.
In total 7 of the 10 participants of the course started in September 2016 answered the questionnaire. Table 3 shows the results.

Table 3. Summary of respondents (N=7)

Scale	Question	(Totally)* Agree	Neutral	(Totally)* Not agree
Teacher Reaction	I have positive memories of the course ATRE	6	1	0
	I enjoyed the course ATRE very much.	5	1	1

Teacher Learning	The course ATRE has been very beneficial to my teaching.	6	1	0
	Participating in the course ATRE is very useful for my teaching.	5	2	0
	As a result of the course ATRE, I know substantially more than I did before.	5	2	0
	I have learned a lot of new things from the course ATRE	6	1	0
Outcomes	In my daily classroom practice, I often apply what I learned from the course ATRE	4	3	0
	I successfully apply the content of the course ATRE in my daily classroom practice.	4	2	1
	As a result of the course ATRE, my students' learning has improved.	2	5	0
	My students have benefited from me receiving the course ATRE.	4	3	0
Organizational response	Overall, the culture and procedures in my school have improved due to the course ATRE.	1	3	3
	My school encouraged and supported teachers in implementing what they learned from the course ATRE	1	4	2

* The number of respondents that answered 'totally agree' and the respondents that answered 'agree' were summarized as were the numbers of respondents that answered 'totally not agree' and 'not agree'.

Table 3 shows that concerning teachers' level (Teacher Reaction and Teacher Learning) the participants were predominately positive. Most participants enjoyed the course and indicated that they had learned a lot. With regards to the question about outcomes, around half of the participants answered positive and half answered neutral on the statements. Especially the improvement of student learning is answered as 'neutral' by most participants. The questions about the level of organizational response showed that the participants were neutral or negative. One participant wrote as comment that honors education is not always supported by the management team.

6. Discussion and conclusion

Teacher development courses should be based on both research and literature to promote their success and impact in practice (Van Veen et al., 2012; Merchie et al., 2016). The design principles we distinguished from literature were translated into a professional development program for honors teachers called 'A Teacher's Road to Excellence.' This resulted in a one-year course based on the honors pedagogy Wolfensberger (2012) identified in her research. According to one group of participants, the impact of following this course was clearly positive for themselves, positive or still unclear on the level of outcomes, and unclear or negative on the level of organizational response.

The design principles were helpful in developing this course for honors teachers, which had, according this group of participants, a positive influence on their learning. The evaluation questionnaire concentrated on different levels of impact, of which the impact on the first level was needed to reach impact on the second level, etc. (McChesney & Aldridge, 2018). The results show that the impact on the first two levels is clearly reached and on the third level, outcome, the impact is almost reached. Probably, to see impact on the level of outcomes, especially on student learning outcomes, more time is needed. This result could also indicate that we have to make changes to the course to reach more impact on this important level. More information is needed to gain insight into how following this course impacts student learning outcomes and how this could be further improved by making changes to the course. If the impact on the third level could be improved, this may also influence the last level, organizational response.

So, the guidelines described are helpful when developing a course. The course 'A Teacher's Road to Excellence' seems to be instructive for honors teachers and impact on student learning outcomes is seen. More research is needed to improve its impact further on an organizational level.

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"Offering freedom" as a teaching strategy for honors students

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1. About 'Offering freedom'

Students who are able and motivated to do more than the regular curriculum offers, the honors students, call for a specific pedagogical approach by teachers (Wolfensberger, 2012). In search of this specific pedagogy Wolfensberger formulated, after literature review and interviews with experienced honors teachers, the three pillars of Honors Pedagogy. These pillars are creating a community, enhancing academic competence, and offering freedom. This note concentrates on the pillar of 'offering freedom,' concerning teaching strategies "that give students space for experimentation, risk-taking, personal initiatives and pursuit of their interests" (Wolfensberger, 2012, p. 23).

To become intrinsically motivated, three psychological needs have to be met, which are autonomy, competence, and relatedness (Ryan & Deci, 2000). The three pillars of honors pedagogy meet these psychological needs. Because honors students prefer autonomy to make their own choices, they appreciate an autonomy-supportive teaching style characterized by relatedness and a good balance between autonomy and structure (Pintrich & De Groot, 1990; Reeve, 2009; Sierens, Vansteenkiste, Goossens, Soenens, & Dochy, 2009).

Starting from the self-determination theory, Reeve (2009) was one of the first to focus on the autonomy-supportive teaching style and defines this as a teaching style in which the teacher (1) adopts the student perspective, (2) supports the intrinsic motivation of the student and his autonomous self-regulation, and (3) is open to the thoughts, feelings, and the behavior of the student. This way, within the context of education, the basic concepts of autonomy, competence, and connectedness as seen in the self-determination theory get a didactic translation.

Teachers who use an autonomy-supportive teaching style focus on stimulating autonomous behavior. Key to it is identifying, feeding, and building up personal interests and values of the students (Reeve & Jang, 2006). Teachers make room to let students solve a problem in their own way or to experiment to discover new things. The students' motivation and the self-regulation is fed by working with challenging assignments that offer freedom of choice.

2. Importance of 'Offering freedom' in honors education

Students who have teachers who use the autonomy-supportive teaching style have a larger intrinsic motivation and detectible competence, a greater perseverance at school, greater academic achievements, and a larger comprehension (Reeve, Jang, Carrell, Jeon, & Barch, 2004). Moreover, they function better in the classroom and achieve higher-level educational goals (Reeve & Jang, 2006; Ryan & Deci, 2000). Autonomy-support leads to involvement, and it offers an optimal challenge, contributing to meaningful objectives (Jang, Reeve, & Deci, 2010).

3. Teaching behaviors that contribute to 'Offering freedom'

It is important that the teacher gives a meaningful rationale behind why putting forth effort during the activity might be useful. By doing this in an autonomy-supportive way, the perception of the task importance and the on-task engagement of participants' efforts increases (Reeve, Jang, Hardre, & Omura, 2002). Teachers can give this meaningful rationale by offering the student a realistic explanation (Jang et al., 2010). By doing so, the teacher offers structure by putting the learning activities of the students into a framework and being explicit about what is expected from the student (Reeve, 2009; Skinner & Belmont, 1993). The teacher structures the learning activities for students in order to support the students and let them feel competent to work on the assignments. Teachers who offer structure are associated with a higher level of self-regulation in students (Sierens et al., 2009). Structure is utilized by a teacher to support autonomy and to facilitate connectedness.

The research of Wolfensberger resulted in three clusters of teaching strategies that can foster the offering of freedom (Wolfensberger, 2012; Wolfensberger, Drayer, & Volker, 2014):
- Strategies that create space for students' questions, choices, and initiatives' scaffolding
- Strategies that foster the sense and excitement of experimentation
- Strategies that treat honors students as 'junior colleagues' in research and education (activities)

Creating space for choices and initiatives
Offering space to make choices and taking initiative implies that the program is (partly) directed by the student and is often called personalized education or student-centered education (Biggs & Tang, 2003). Quite often, this program type implies freedom of choice in the what of learning: assignments, choice of the subject, or working methods (Voogt, Smits, & Jonker, 2017). However, attention for the when, where, and how also supports learning activities with the student in the lead (Voogt et al., 2017). Using open assignments can also support and challenge students to experiment and try something new. Important in this is that the teacher asks questions and stimulates the students to think about their experiences and what they have learned.

Allowing students to experiment
Offering freedom through the sense of experimentation and the team feeling is fed by the following teacher behaviors (Reeve, 2016; Ryan, 2016):

- Providing space for students to solve the problem in their own way
- Encouraging students' experiments to explore new solutions or methods of working
- Creating challenging, open-ended assignments, which offer freedom of choices (content, materials, and methods)
- Providing explanatory and positive feedback to students
- Making instruction relevant to their lives by meaningful rationales
- Being interested and engaged as an authority

Experimental education has figured prominently in honors education programs for decades (Holman, Smith, & Welch, 2009).

Offering students trust and guidance and treating them equally
Offering students trust can be done by giving students special duties and responsibilities and second chances (Finley, 2013). The contact and the interaction with the teacher is an important determinant for the learning outcomes of the student. Activating engagement (Reeve, 2013) and genuine interest in the student is the key to success and to turning on the autonomous motivation of the students (Van Lieshout & Bakx, 2014).

A factor which has impact on the treatment of students is the way of communication and interaction (Sarrazin, Tessier, Pelletier, Trouilloud, & Chanal, 2006). Sarrazin et al. (2006, p. 292) distinguish different types of verbal interaction in their research: organizational communications, technical or tactical hints, asked questions, praises, encouragements, perspective-taking statements, negative communications, and criticism. For each type of verbal interaction, they give examples of communication in a controlling way, in a neutral way, or in an autonomy-supportive way. An example in a neutral way is by asking the student: is it your last try? An example in a controlling way is by asking a student: what have I just said, Paul? An example in an autonomy-supportive way is by asking the student: which exercise do you start with?

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"Creating community" as a teaching strategy for honors students

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1. About 'Creating community'

Students who are able and motivated to do more than the regular curriculum offers, the honors students, call for a specific didactic approach by the teachers (Wolfensberger, 2012). In search of this specific pedagogy, Wolfensberger formulated the three pillars of Honors Pedagogy. These pillars are creating a community, enhancing academic competence, and offering freedom. This note concentrates on the pillar of 'creating a community,' concerning teaching strategies "that create rapport and connectedness between teachers and students and among students; and that create a learning community" (Wolfensberger, 2012, p. 22).

Cross (1998) defines learning communities as groups of people engaged in intellectual interaction for the purpose of learning. In an honors community, faculty, students, and professionals have close contact and form a network in which interaction among them is fostered as is learning by doing and co-creation (Van Ginkel et al., 2014; Fuiks & Clark, 2002; Stobbe & Hogenstijn, 2017). Research shows that honors communities vary between educational programs in size, structure, level of activity, and interaction (Van Ginkel et al., 2014). However, several key factors can be found; these factors include, for example, frequent formal as well as informal meetings, a shared passion for challenge and excellence, a feeling of belonging, shared ownership, and a culture of excellence. A core group of active members, a physical location, and a safe environment can also promote the development of an honors community (Van Ginkel et al., 2014).

2. Importance of 'Creating community' in honors education

By working and learning in an honors community, students have the opportunity to discuss and interact with peers who are just as motivated and intellectually interested as they are themselves (Kaczvinsky, 2007). The students' academic experience can be enriched through this interaction (Rutland Gillison, 2002) and results in discussions being stimulated

(Robinson, 1997). Students and teachers indicate that these interactions especially make honors activities valuable, and they are experienced as being essential to the honors program (Coppoolse, Van Eijl, & Pilot, 2013).

Furthermore, participation in learning communities results in better academic performance in terms of knowledge, skills and competence, and integration of academic and social experiences (Zhao & Kuh, 2004; Van Lankveld & Volman, 2011). Also, social adjustment to university life can be eased by participating in a learning community as is students' engagement (Zhao & Kuh, 2004) and well-being (Van Eijl et al., 2013). Participating in an honors community can also have a positive influence on talent development (Van Eijl et al., 2013; Sosniak, 2006).

3. Teaching behaviors that contribute to 'Creating community'
Teachers seem to play a crucial role in facilitating the development of an honors community (Sherin, Mendez & Louis, 2004). The research of Wolfensberger (2012, p. 148-149) resulted in three clusters of teaching strategies that can foster the creating of a community:
- Strategies for building an effective relationship between teachers and honors students and among honors students
- Strategies and forms of teacher behavior that create a positive and supportive spirit
- Strategies and forms of teacher behavior that make the teacher part of the community in a practical and a personal sense

An example of a strategy for building an effective relationship between teachers and honors students is the appreciation of students' questions and remarks. This strategy has to do with trusting the students and giving them the confirmation that they are doing well, something Dutch honors teachers mentioned as being important for students (Kingma et al., 2017). Also, talking with students and giving them feedback as if they are equal to and as important as the teacher is a way to show appreciation for what students say and do (Wolfensberger, 2012, p. 26). Letting students finish their remark or question, answering their questions seriously, complimenting them when appropriate, and listening actively to them will show appreciation for what they said.

An example of a strategy that creates a positive and supportive spirit is inspiration. Inspiration energizes and gives direction to behavior. Exposure to high-achieving role models of whom the successes are relevant and attainable led people to adopt more positive self-conceptions and inspired them to set higher aspirations (Lockwood & Kunda, 1999). When teachers are seen by students as role models, they are able to boost the aspirations of their students and influence the students' professional identity formation (Apker & Eggly, 2004). Figures of authority who exhibit wisdom and promote positive values of civic engagement are people honors students are inspired by (Wolfensberger, 2012, p. 32). A positive attitude, compassion, integrity, subject-related enthusiasm, and the ability to teach are important qualities of teachers to inspire students (Wright et al., 1998). Students can also get inspired and be engaged by opportunities to co-create their own honors education with teachers (and management).

A strategy to make the teacher part of the community in a practical and a personal sense is to create a supportive, friendly atmosphere in which students learn from each other

(Wolfensberger, 2012, p. 148). Working towards such an atmosphere in the honors class starts with taking the time to get to know each other, for example, by starting with a special introduction meeting or a camp (Van Eijl et al., 2013; Kingma et al., 2017) or by organizing fieldtrips later on. Van Eijl et al. (2013) advise to promote the creation of a community by having students work together in small groups, matching students based on their willingness to work together, facilitating initiatives of students - which is comparable to giving room for students' personal interests – and stimulating the use of social media. Being available and easily accessible for students is linked with creating the atmosphere of community as is demonstrating commitment to the honors community. Besides, Whitlock and DuCette (1989) indicate that enthusiasm, empathy, and openness are all qualities needed to create community. These are qualities that help to improve the atmosphere and create a supportive and friendly environment in which students learn.

4. Community outside class

Although teachers are pivotal for creating community in class, an honors community is not created in class alone. It is important to give honors students opportunities to manifest themselves outside of class, for instance, through institutional committees, honors students boards, and service learning projects. Adopting a project as a group, so that honors students can share their talents to move the world, is also a way to create community. Honors groups can choose to endorse a project, for example, in refugee camps and collect money or do voluntary work. Furthermore, shared goals within their university enables students to create community, for example through projects that transfer honors to regular education to partner with freshmen or facilitate workshops.

Apart from honors teachers and students, a supportive management and university board is also essential to create an honors community. Having an honors director or honors dean as well as a specific physical honors location / rooms are listed among the basic characteristics of a well-functioning honors program the NCHC developed (NCHC, 2010).

5. Final remarks

Most of the research concerning honors teaching is based on empirical data collected in Anglo-Saxon educational cultures, which is certainly a limitation.

Wolfensberger (2012) offers an honors signature pedagogy with three main components, namely: creating a committed community, enhancing academic competence, and offering bounded freedom. It is clear that those three are interwoven and interconnected. It is also clear that both teachers and students play an important role.

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Note

On student reflective portfolios in honors education

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1. Reflective portfolios in higher education

This note describes the use of portfolio reflections in undergraduate honors education to foster and assess the development of students throughout their honors education and their regular program. Reflection can be defined as: "a cognitive and affective process or activity that (1) requires active engagement on the part of the individual; (2) is triggered by an unusual or perplexing situation or experience; (3) involves examining one's own responses, beliefs, and premises in light of the situation at hand; and (4) results in integration of the new understanding into one's experience" (Rogers, 2001, p. 41). When used in higher education, reflections – or reflective essays – are usually bundled in portfolios. Students commonly reflect on their education and development at set times, and reflections are typically assessed formatively, although summative evaluation is possible. Since people construct meaning "in the space between their experiences and their reactions to the experiences" (Kegan, 1982, p. 2), reflective portfolios can be very helpful for students in navigating their experiences in higher education. Two important reasons why programs should implement the use of reflective portfolios in their curricula are (1) to assist students to make connections and (2) to foster self-understanding and meta-cognitive skills (Landis, Scott, & Kahn, 2015).

Students' development throughout their education, which students reflect on in their portfolios and which therefore plays an important role in the literature on reflective portfolios, can be linked to self-authorship: "an ideology, an internal identity, a *self-authorship* that can coordinate, integrate, act upon, or invent values, beliefs, convictions, generalizations, ideals, abstractions, interpersonal loyalties, and intrapersonal states. It is no longer *authored by* them, it *authors them* and thereby achieves a personal authority" (Kegan, 1994, p. 185, italics in original). Three aspects of development are unified in self-authorship theory (Kegan, 1994):

- epistemological development, which encompasses "how people use assumptions about the nature, limits, and certainty of knowledge to decide what to believe," leading to students who "integrate disparate information to make decisions" (Baxter Magolda & King, 2007)
- intrapersonal development, which concerns "how people construct their identities," leading to students who "explore, reflect on, and internally choose enduring values to form their identities, and use this internal identity to interpret and guide their experiences and actions" (Baxter Magolda & King, 2007)
- interpersonal development, which describes how people form "mature relationships that require respect for both self and other," leading to students who "have the developmental capacity for interdependence, or the ability to respect one's own and others' needs, negotiate multiple perspectives, and engage in genuinely mutual relationships" (Baxter Magolda & King, 2007)

Baxter Magolda and King (2007) summarize that "self-authorship on all three dimensions reflects the integrated developmental capacities that are inherent in the cognitive, identity, and relational maturity required for college graduates to be effective workers, parents, family members, and citizens" (p. 492).

Yancey (2004) posed that there are actually multiple curricula at hand when talking about higher education: "the *delivered* curriculum of the classroom, the *experienced* curriculum as students receive and practice the delivered curriculum, and the *lived* curriculum as students learn over time from all sources in and beyond the classroom." (in Landis, Scott, & Kahn, 2015, p. 108).

Reflective portfolios offer an excellent way for students to document their journey across these curricula and for teachers to follow and, where necessary, guide students on their journey (Landis, Scott, & Kahn, 2015). For an example – and results – of how an interdisciplinary curriculum fosters self-authorship characteristics through their reflective portfolios, see Van der Lecq, 2016.

2. Reflective portfolios in honors education

Honors education typically provides extra opportunities to talented students (Wolfensberger, 2015). Most honors programs offer students ample opportunity to explore their talents and interests in a meaningful and often rather autonomous way. Reflective portfolios present a means for students to document their development of the three aspects of self-authorship (Kegan, 1994) through the three different curricula in higher education (Yancey, 2004) and – as important – for teachers to follow and guide students on that journey. As such, students can reflect on or make connections between:

- the different courses in their honors education
- their honors education versus their regular education
- their education versus their career
- their education versus their personal life

Since honors education can be experimental for staff as well, an additional benefit is that teachers are directly confronted by how students learn. Indeed, Landis, Scott, and Kahn (2015) found that teachers "noted direct benefits for themselves and their projects from improved understanding of their own curricula as they 'closed the loop' on their assessment and reflected ever more deeply on their own teaching practice" (p. 117). Although, in our

case, the portfolio is not used to assess the effectiveness of courses or the curriculum, this is – according to Banta (2003) – possible. Another benefit for staff is that the portfolio aids archiving because students add 'evidence' of their honors education to their reflections.

3. Reflective portfolio in Utrecht University's Humanities Honours Programme

At the Humanities Honours Programme of Utrecht University, The Netherlands, students keep a written portfolio in which they reflect at least three times:

- at the start of the Honours Programme, which is the second year of their undergraduate education
- at the end of the first year of the Honours Programme
- at the end of the two-year Honours Programme, which coincides with their undergraduate graduation.

Students set goals, reflect on the goals, and look ahead. These reflections are supported by course results, projects, essays, and other evidence. The portfolio is usually a digital pdf-format for ease of archiving. Students are free to personalize the portfolio by adding illustrations, posters (e.g., of lectures or workshops they have organized as part of their honors education) and pictures (e.g., of international study trips or their thesis defense). By looking back and looking ahead at fixed moments in their curriculum, the portfolio forms a continuing element in students' study careers. After handing in their written portfolio reflections, students have a one-to-one conversation with their departmental honors coordinator to discuss the reflections and their academic and personal development. Students are assessed formatively, and they do not receive credits for the portfolio. A "sufficient" portfolio is, however, a prerequisite for finishing the honors program and obtaining the certificate.

Students are prompted to write about specific aspects about the program. These prompts guide students' development through their education and entail the following features:

- at the start of the honors program, students are asked – in approximately 250 words each – to (1) introduce themselves by explaining their background, why they applied for the honors program, and what extracurricular activities they are involved in, and (2) make a study plan for the coming year, elaborating on which regular and which honors courses they are planning to take, what their learning goals are, whether they are looking for academic depth, interdisciplinary breadth, or a bridge with society. Evidence they are asked to attach includes their motivation letter for the honors program and their CV
- at the end of the first honors year (which is the second year of their undergraduate program), students are asked – in approximately 500 words for (1) and 250 words for (2) – to (1) reflect on their first honors year, including how they feel about the past year, which courses they took, what they learned, what they are proud of, what they would have liked to have done better, how they contributed to the honors community, and whether they reached the goals they set at the beginning of the year, and (2) make a study plan for the next year, similar to how they did at the start of the honors program. As evidence, they include an overview of their course results and reports and projects of honors courses they produced
- at the end of the second year of the honors program (which is also graduation), students are asked – in approximately 500 words each – to (1) reflect on the past year in the same way as they did at the end of the first honors year and (2) to reflect

on their participation in the honors program and their regular undergraduate program, including a description of how they look back on their education and a comparison of honors and regular undergraduate education, whether the expectations they had at the beginning of the program were met, and how they view their future. Included evidence again contains an overview of course results and reports and projects of honors courses, including their honors thesis.

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