# Accounting for sustainability: an active learning assignment

Accounting for sustainability

320

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#### Abstract

**Purpose** – Sustainability is one of the newer topics in the accounting courses taught in university teaching programs. The active learning assignment as described in this paper was developed for use in an accounting course in an undergraduate program. The aim was to enhance teaching about sustainability within such a course. The purpose of this paper is to offer experience-based guidance to faculty members around the world who would like to include sustainability in their courses.

**Design/methodology/approach** – This paper describes the introduction of sustainability in an accounting course via an active learning approach. The assignment that was developed formed part of a management accounting course for 450 business students. In the assignment, the students were asked to propose a sustainable solution for the university organization. Several tools were provided to the students to support them in obtaining an insight into the financial and societal consequences of the proposed solution.

**Findings** – The encouraging experiences with the assignment at the university where it was designed show that it effectively improved students' understanding of sustainability issues. Furthermore, the assignment provided insight into how management accounting can play a role in enhancing sustainability in an organization. Additionally, the experiences with the assignment show that it can be used to make courses more lively and attractive to students.

Originality/value — As yet, textbooks have not offered much support in how to incorporate sustainability into the field of accounting. The assignment represents a novel use of management accounting concepts in the study of sustainability and is relevant to educators as an example of an active learning approach on the topic of sustainability.

**Keywords** Higher education, Management accounting, Sustainability, Active learning, Business and management

Paper type Research paper

#### Introduction

This paper describes the introduction of sustainability in an accounting course by means of an active learning assignment. Active learning involves processing information on an individual basis to enhance learning. In this way, students develop their own solutions and/or explanations. In other words, they take ownership of the knowledge they gain and are as a result better able to retain this information (Springer and Borthick, 2007).

The active learning approach was used for the following reasons. First, the sustainability theme has until now not been included in the conventional management accounting textbooks. Second, the concept of sustainability does not fit a traditional teaching strategy based on relatively passive means, such as lectures or notes prepared by the professor. Third, interaction with the business world helps students, who mostly lack relevant work experience, and improve their understanding and comprehension of accounting concepts (Matherly and Burney, 2013).

This paper describes the design, the implementation process and the results of the active learning approach. The assignment was developed within the department of Accounting at



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330

the University of Groningen (Faculty of Economics and Business). It served two goals simultaneously:

- (1) introducing sustainability into the accounting course curriculum; and
- (2) applying an accounting concept to a real-life situation.

Sustainability is a broad concept, which is often quite difficult to grasp for students. However, if students are going to be the ones to manage organizations sustainably in the future, they certainly need to learn about this topic and practice with it during their study. Practicing not only increases the understanding of what sustainability really is but also instills a culture of sustainability, as shown by Levy and Marans (2012) at the University of Michigan. Here, the introduction of sustainability and the application of an accounting concept in practice was also executed by means of an active learning assignment. Active learning[1] is defined as the process of learning new ideas, skills and attitudes through what we do at work, school or in other behavioral settings. The approach emphasizes the application of theory and concepts by involving students in the learning process through the use of "problem-solving exercises". Active learning is more effective in increasing students' understanding of difficult concepts than the traditional methods are. This is because it stimulates students to think critically about the information presented to them and apply it accordingly (Auster and Wylie, 2006). Other terms used to describe active learning are "interactive instruction" and "experiential learning" (McCarthy, 2010; Smart and Csapo, 2007). In the assignment, students learned how an accounting concept can be used to integrate sustainability in an organization. The objectives of the assignment are discussed later in this paper.

## Incorporating sustainability in a management accounting course

Evidence suggests that the integration of sustainability into the higher education curricula has as yet not been given priority and that the concept is a rather new phenomenon. Burritt (2012) shows some progress in the theme's introduction in the Australian higher accounting education over the past 15 years.

Accounting courses are generally mainly focused on the inside of an organization without paying much attention to the wider context of organizational operations, such as the environment and society. Despite the increasing visibility of sustainability both worldwide and in higher education, some accounting lecturers and researchers have questioned the need for introducing sustainability themes into their courses. Collison *et al.* (2000, p. 171) put it somewhat skeptical: "Students are looking forward to acquiring their Porsche while academics focus on problems of teaching and administering large classes". In this paper, it is argued that if university graduates are the ones who are going to work in sustainable organizations, the university programs (including the accounting curricula) should prepare them for this task by teaching them the relevant critical and ethical skills. Furthermore, the narrowness of (accounting) education should be reduced by actively responding to changes and new developments in society (Gibson, 1997). This is consistent with the view expressed by Barber *et al.* (2014) that many business schools are lagging in incorporating sustainability into their curricula, and are thus not adequately educating the next generation of business leaders.

Also at the University of Groningen (The Netherlands), sustainability as a specific course or as a formal track is absent. However, sustainability issues are clearly embedded in the multiple courses. Several departments at the faculties of Economics and Business (FEB), Psychology and Spatial Sciences introduced sustainability-(energy)-related themes in the courses they provide. Examples of courses at the graduate level are Asset Life Cycle



Management, Environmental Economics and Responsible Finance and Investing (FEB) and Reinventing Environmental Planning in Master Environment and Infrastructure Planning (Spatial Planning faculty). The graduate courses Environmental Psychology and Social aspects of Sustainability (honors' course) at the faculty of Psychology are other examples. At the undergraduate level, the education related to sustainability is limited to incidental bachelor thesis teaching[2]. Prior to the learning assignment presented in this paper, none of the courses in the accounting curriculum, both at the undergraduate and the graduate levels, included sustainability.

The problem of introducing sustainability in the assignment was tackled by using the results of academic research published by Lamberton (2000). Lamberton used the following sustainability definition, based on the Brundtland Report:

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs [...] Development involves a progressive transformation of economy and society [...] But physical sustainability cannot be secured unless development policies pay attention to such considerations as changes in access to resources and in the distribution of costs and benefits. Even the narrow notion of physical sustainability implies a concern for social equity between generations, a concern that must logically be extended to equity within each generation (WCED, 1987, p. 43).

Lamberton (2000) developed and tested a sustainability accounting model for managing an organization's performance in achieving sustainable development. To realize this objective, a mix of ecological, social and economic goals are set. To measure the organization's performance in achieving its ecological efficiency and sustainability targets, the model uses environmental performance indicators and life cycle analysis based on a mix of quantitative and qualitative data. The article illustrates how the accounting model is implemented in a city farm that produces organic vegetables and fruits for city inhabitants in a sustainable manner. For the learning assignment, the students were asked to study the article and use its concepts as a theoretical base.

For a more elaborate discussion on the sustainability concept and its definitions, students may be encouraged to study a comprehensive concept definition analysis presented by van Marrewijk (2003). This author proposes a set of differentiated definitions of sustainability, each related to a specific ambition level of an organization. For advanced learning purposes, a critical review of the accounting narratives in relation to sustainability by Gray (2010) may be a great source of knowledge. Gray also describes the work of Lamberton (2000) used in the assignment under the non-financial narratives.

The methodology used in Lamberton's article – describing how to enhance sustainability in a farm – could be replicated in this assignment. By studying the research article, the students learned how sustainability and accounting (concepts of cost, revenue and performance) can be linked and jointly applied in research.

#### Active learning: how to apply accounting in practice

One of the challenges faced by accounting lecturers is teaching students about new developments in the management accounting field. In management accounting education, linking theory to practice has always been a difficult issue as well. Baldvinsdottir *et al.* (2010) recommend harnessing the findings of empirical research to further develop and support practice. Incorporating these findings into the management accounting curriculum would be a (challenging) way to implement their recommendation. A method such as the active learning assignment may make this feasible. In addition, linking accounting concepts with "hot" or more practical issues may altogether revamp the management accounting field —



which is sometimes perceived as rather "dry" - and offer an interdisciplinary learning opportunity.

Linking accounting to sustainability or sustainable development can therefore be seen as a way forward when lecturers want to teach students how to apply accounting in practice. As sustainability stems from the concern for ecology and social well-being for now and the future, accounting for sustainability includes not only traditional financial goals but also environmental and social goals. This broad focus can help organizations in setting new values for an organization. Sustainable development is also about improving quality of life and creating social capital and thus usually has a long-term focus. Management accounting can be essential for achieving sustainable development because it generates data and provides feedback about performance at the organizational as well as the individual level in relation to the sustainability objectives. To capture the performance of organizations usually a mix of financial and non-financial measures is used, depending on the organizations' strategies (Yakhou and Dorweiler, 2004; Van Veen-Dirks, 2010).

Below, the assignment will be described in detail. In the conclusions, the authors will return to the challenges described above.

# Accounting meets sustainability in the active learning assignment

The learning objectives

The learning objective of the assignment was that students would become skilled at applying a management accounting concept to a sustainability theme in a real-life organizational context. For the assignment, the lecturers prescribed the university organization as the object of analysis. Choosing the university organization was inspired by the idea to measure and potentially increase the sustainability awareness among students and staff members. Other objectives were teaching students how to work in groups and how to write a concise business report.

The assignment formed part of a management accounting course for business students in three undergraduate programs: technology business administration, business administration and technology management. About 450 students attended the course. It is taught once a year in the second year of all three programs. In the assignment, the students were asked to propose a sustainable solution to/application for the university. To gain an insight into the financial and/or societal consequences of the proposed instrument, its design had to be based on a management accounting concept. The final presentation of the assignment was a written report in the form of a mini-case description.

In the assignment, students had to calculate the financial and/or non-financial outcomes of either an existing or a fairly new sustainability solution on the basis of one of the following three accounting concepts: costs, income or performance management. The accounting concepts were based on the course book "Fundamental Management Accounting Concepts" by Edmonds *et al.* (2011). As describing these concepts is beyond the focus of this article, a reference to the literature for this course is made for further information. For each accounting concept category, several examples are presented below:

- cost: behavior, types, accumulation, allocation and categories, planning for profit and cost control, cost calculation and allocation, product cost in service organization and cost differentiation;
- income: value, profitability analysis, analysis of the volume and prices related to profitability, relevant information on specific decisions, financial and non-financial revenue; and
- performance management: planning for profit and cost management, performance evaluation, responsibility accounting.

Accounting for sustainability

333

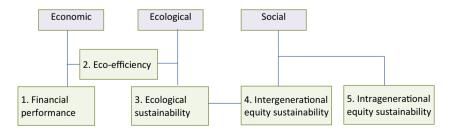
The study by Lamberton (2000) was used as the core research article in the assignment. It merges several methods of accounting for sustainability, namely, the concepts of eco-efficiency, eco-justice and inter- and intergenerational equity. Eco-efficiency links economic with ecological issues, focusing on the production of more goods and services by using less natural resource inputs (Schaltegger *et al.*, 1996), whereas eco-justice links social with ecological issues (Bebbington and Tan, 1996) emphasizing the maintenance of natural resources for future generations (intergenerational equity) and the redistribution of wealth to alleviate poverty (intragenerational equity). While eco-efficiency aims at the conservation of the natural resources (Milne, 1996), ecological sustainability goes beyond this objective by requiring their preservation, which is crucial to achieving humankind's inter-generational obligation to provide future generations with healthy and resilient ecosystems (Van den Bergh, 1996).

Lamberton decomposes the ecological, social and economic dimensions of sustainable development into five measurable performance factors (Figure 1). These factors can be used to evaluate the performance of organizations striving to achieve sustainable development.

The themes in the assignment were taken from the sustainability accounting model of Lamberton (2000), but adjusted to the requirements of the context and the specificity of the university type of organization. In addition to the pre-specified themes, students were also allowed to deliver their own themes, as long as they were related to sustainability. Sustainability themes used in the assignment based on similar themes as in Lamberton (2000) are as follows:

- (1) recycling and waste management;
- (2) water management;
- (3) energy management: electricity and lighting;
- (4) IT hardware and e-learning tools digitalization of education;
- (5) transport management;
- (6) social aspect: compliance with norms;
- (7) social aspect: stakeholders (social) management; and
- (8) other ideas provided by students.

Although Lamberton (2000) estimates the impact on two levels – the organization itself and its suppliers – the focus in the assignment was narrowed to the level of the organization (the university). This was done for reasons of feasibility and time saving. The first three themes, namely, recycling, water and energy management, are standard topics that are linked to sustainability with respect to the university's output (waste) and two types of input (water,



Source: Lamberton (2000)

Figure 1.
Sustainability accounting model



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334

energy). The fourth theme concerns the university's computer hardware, e-learning tools and digitalization, which is subdivided into the digitalization of education, for example, digital examinations or digital lectures and the digitalization of documentation, e.g. transcripts, education support services, etc. The theme transportation management refers to the university's facility services. Themes 6 and 7 relate to the social dimensions of sustainability: compliance with standards (environmental, health, safety, certification, and, for example, the Binding Study Advice)[3]. The stakeholders theme (7) is divided into students, employees and society. "Other ideas" include all sustainability ideas going beyond the pre-specified themes

## The implementation guidelines

The students enrolled via an online e-learning environment (Blackboard) into one of the eight themes in groups of three to five participants. In each theme, the students had to choose between one of the three accounting concepts as described in the previous section: costs, revenues and performance. A maximum of five groups could apply for a topic. This threshold was dictated so that the potential interviewees (for example, the staff of the facility service for the "Electricity" theme) would not be approached by too many students. In addition, as regards data collection methods, the students were advised to consult a research methodology textbook (Blumberg *et al.*, 2011) from a first year-course. Each group could choose from a range of possible data sources, while it was also possible to combine data sources. The following sources of information/data were suggested:

- (annual) reports;
- · documents in the online e-learning environment;
- correspondence with suppliers and municipal;
- · interviews with employees (formal and informal);
- · direct measurement of the primary data, such as power consumption costs;
- publications available in the organization;
- · observation at meetings or lectures; and
- interviews with stakeholders e.g. residents, staff or students.

Each group had to produce a report, which had to include theoretical descriptions of the management accounting concept and the chosen sustainability theme. The data collection should also be briefly described in the report: e.g. source of the document, type of document, references or information about the interview (respondents, interview dates, etc.). Based on an analysis of the collected data, the report had to include suggestions for changes, improvements and/or applications. These suggestions had to be evaluated and the report had to end with conclusions.

The assignment was mandatory for all participants and represented 20 per cent of the final grade of the course. Before the start of the project, the assignment and the assessment criteria in the form of an evaluation sheet were communicated to the students. The content of the case study contributed 70 per cent and the quality of the report 30 per cent to the final assignment grade. The evaluation of the case study was standardized in an evaluation form because this type of evaluation is suitable and efficient for large group teaching. For smaller groups, a more elaborative assessment method can be used, including more qualitative feedback.

The study load of the assignment was 1 ECT (=28 h) (20 per cent of the final course grade). The assignment was introduced during the first session, which took about half an



hour. The rest of the time the students worked on the assignment, which had to be completed at the end of the 6 weeks teaching block. The lecturers additionally held weekly consultation hours for questions and, if necessary, a midterm feedback review. The lecturers' workload contained the following tasks: coordinating the group enrollment, being present during the consultation hours (6) and the correction of the assignments. Owing to the standardized feedback form for each assignment, evaluation took on average 15-20 min per group. It was performed by a team of three student assistants and the coordinating lecturer.

## Results of the assignment

The grading procedure

Slightly over 100 reports were submitted, reviewed and evaluated. To assure sufficient reliability and coherence in grading, first, five assignments were graded by each member of the evaluation team individually at the start of the evaluation round. Next, the evaluations were discussed by the team and the differences explained. After the discussion, the general grading guidelines were established and the assignments divided among the team members. Another reliability check included the review of the assignment organized for students who wanted to discuss their feedback. During this meeting, the lecturer was able to confirm all of the feedback provided by the other team members. No grade adjustments were required.

## Variety of ideas

While doing the assignment, the students learned that the University of Groningen is very active in the fields of sustainable waste management and recycling. It has set itself the goal of becoming a good example of a sustainable organization, concentrating on various areas: sustainable living, sustainable management, sustainable development, and education and research aimed at sustainable development. The variety of ideas in the reports reflected this diversity: students not only developed plans for the improvement of existing practices and the realization of cost savings but also proposed a completely new investment alternative for a carbon neutral sustainable dormitory complex at the campus.

Achieving cost savings by applying sustainable solutions such as electricity and water usage decrease was by far the most favorite theme. The capacity released for this topic was entirely used. In contrast, Income and Performance Management were less popular; none of the reports handed in were about the development of non-financial performance indicators of sustainability. The reports showed that the students applied the quantitative management accounting concepts (cost calculation or calculating financial return) relatively easily. On the other hand, they found it more difficult to process and develop other information that required the design of key performance indicators. Furthermore, the preference for electricity and water usage savings indicates that these objectives formed the most desired ecological dimensions of sustainability. A few reports dealt with sustainability from the economic perspective by presenting initiatives to calculate the university's income returns from investments in this field. The social dimension was mostly absent in the reports. The preference for one particular dimension may signal students' limited understanding or low awareness of sustainability as a three-dimensional concept[4]. Although different options for the assignment were emphasized, it might be the case that students implicitly expected that they should emphasize the cost element of sustainability. This would be in line with the ideas expressed by Fisher and McAdams (2015), who indicate that students may be exposed to particular messages within an academic division that encourage students to emphasize particular elements of sustainability. While the students had access to a research article on sustainability accounting, which provided them with a clear definition as well as additional knowledge of the multidimensional nature of the subject, its application in practice appeared to remain a challenge.



336

Furthermore, in their choices regarding data collection and participants in their surveys, the teams showed a strong preference for one particular type of data source and one particular respondent, namely, email and the facility management officer, respectively. This was surprising, as the lecturers had suggested a variety of data source options, secondary data sources, academic databases and different respondents within the university. In addition, the narrow choice in themes resulted in an overload of data queries and applications for interviews at the facility services department. This overload had a negative effect on the response rate and the willingness of this department to meet with the students. Some signals were received from the students that it was sometimes difficult for them to gather data; university staff members were not always eager to disclose the information requested. The faculty management pointed out that before students could be allowed to collect information from the university in the way they did, this type of project should first be discussed and approved of by the board.

## Sustainability awareness

Although the students met some obstacles, they appreciated the practical focus of the assignment and the opportunity they were given to implement acquired knowledge directly within the context of a real organization. They indicated that this type of assignment had "awoken their knowledge". This is exactly what active learning is all about. Accounting students were introduced to a concept, in this case sustainability, and asked to link its theoretical to its practical aspects by conducting a field study. In their reports, the students had to advise the case organization on its practice on the basis of theory. So, they had to link the content of the research article to the course book information and apply this knowledge to their study object, the university. The conclusion is that the assignment method certainly contributed to an increased awareness of and insight into sustainability, both on the part of the students and on the part of the university. Using this approach, sustainability became more tangible and less abstract, while simultaneously, the practical applicability of management accounting was demonstrated.

The findings from the students' reports were documented in an Executive Summary, which was sent to all respondents and stakeholders who had been involved in the assignment (named "Accounting for Sustainability"). In the Executive Summary, the participants were also thanked for their cooperation and efforts. In reaction, several positive responses were received, indicating support for the initiative. In that sense this assignment also had a positive effect on the level of sustainability awareness among university employees.

The students' comments in the course evaluation indicated that the interaction with the practical field was appreciated. The students liked the challenge that was offered by the assignment and experienced the assignment as more inspiring than just reading and memorizing a textbook. The students had experienced difficulty, however, in collecting the data. It may therefore be necessary to specify the different data sources more explicitly, both in the course manual and the introduction lecture. As far as the lecturers were concerned, this assignment provided a useful overview of the problems encountered by students when performing a practice-oriented assignment. Furthermore, it appeared that students prefer a highly detailed description of the steps to be performed in assignments such as the steps described in this paper. The assignment also taught the lecturers that many initiatives can be labeled as sustainable, but that their categorization is still fragmented and not classified under one terminology. The stakeholders were both positive and critical about the assignment. They appreciated the project, but at times perceived the interview teams as



sustainability

Suggestions for further use of the assignment

Except for the implementation guidelines described above, there are some other suggestions, which may be useful to take into account when implementing the active learning assignment method. The cost accounting course book used in this assignment (Edmonds et al., 2011) may be replaced by any other representative standard work. Furthermore, apart from the research article of Lamberton (2000), which describes a case study at a suitable introductory level and presents a comprehensive sustainability accounting model, there are also other interesting articles that could be used. Another option is to have students select their own articles. In addition, having students prepare a summary of the article could enhance their theoretical base knowledge required for performing the assignment. As regards conducting the assignment in-house, it may be desirable to provide some assistance to the students prior to the interviews. Approval and support from the top of the organization (board, managers, coordinators), for example, would make the data collection process more workable and effective for the students. More generally, it is very important to assist the students in their data collection, especially at the start of the assignment.

There were no complaints about how the process of the assignment was organized. What the students did mention was that having the reports delivered in hardcopy was not in line with the principle of sustainability. This was done, however, because the Ephorus program for checking plagiarism was used for the first time. To have back-up copies of the reports available in case of digital problems (e.g. a system crash), the students were also asked to hand in a printed version.

Finally, the evaluation of the assignment should predominantly focus on how well the students managed to activate their knowledge by linking traditional accounting concepts to the sustainability theme and by applying these constructs within an organization. As the assignment's main objectives are to activate learning and to implement a theoretical concept in a practical context, the content quality of the students' solutions and improvement suggestions should not be given too much emphasis.

#### Conclusions

In sharing their experiences with this project, the authors have attempted to present a useful instrument for introducing sustainability in management accounting courses. This instrument is meant to fill the lacuna created by the accounting course books, which until now have disregarded the theme of sustainability. It became clear from the project that second year students enjoy making the link between an accounting concept and a theme such as sustainability in a real organizational setting.

In addition to the assignment's core objective (introducing sustainability in the field of accounting), another positive outcome is that it contributed to increasing the sustainability awareness among both employees and students of the university. Since this assignment took place, many other initiatives have been undertaken; a Green Office has been set up, there are open courses on sustainability for everyone and the university position on the sustainability rankings has improved, even reaching the gold status of the SustainaBul in 2015[5], and becoming the highest ranked Dutch university in the sustainability ranking of the Green Metric in 2016. In this ranking, the University of Groningen came in at number 12 of the 407 participating universities worldwide. So the impact of the active learning approach presented in this paper can be considered as twofold:



337

- (1) it has proven to be an effective instrument for introducing a new concept in the field of management accounting; and
- (2) it has kindled the already emerging interest in sustainability.

For the lecturers, the introduction of an active learning assignment has been a multi-layered experience. It was a challenge to link a common accounting course to a new phenomenon (sustainability) and teach this course to a large group of undergraduate students. Furthermore, this course had a practical focus, which implied that a research study had to be conducted in a real organizational context, in this case the students' home university. The support of software (Blackboard) was essential in handling the large group of students. But although the Blackboard e-learning platform proved to be supportive in organizing a large number of students, the software tools did not replace the face-to-face contact between student and lecturer. The students indicated that they highly appreciated the opportunity to discuss the project face to face with the lecturers. Some used the opportunity for live feedback extensively.

Looking back, it may be concluded that the assignment was successful in activating student learning and making the management accounting field more interesting. In addition, the authors mapped out new opportunities for linking an active learning approach to conducting research in a practical setting with the concept of sustainability. The authors hope that this paper will be inspiring for other faculty in economics and business. The paper provides an example of how to incorporate sustainability into teaching, which can be used at other institutes of higher education, and not only in accounting courses but also in other courses. Practical application of the principles of sustainability may lead to changes in the behavior and thinking of students because the practical application of these principles in an active learning assignment helps students understand what sustainability really is and makes them think critically about this concept when applying it. The generic attribute of critical thinking is highly valued in universities, but the problem is that is not always easy to determine teaching strategies that help students to develop into skilled critical thinkers (Howlett *et al.*, 2016).

Furthermore, it became clear from the project that the assignment also adds to the ongoing processes that help instill a sustainable culture in the university organization (Levy and Marans, 2012). Finally, the authors expect that an increased sustainability awareness of the students will lead to an increased commitment to sustainability development. This is important when these students become active members of society or when they reach a leading and influential position in an organization.

#### Notes

- 1. Source: www.neiu.edu/~dbehrlic/hrd408/glossary.htm
- 2. Based on the overview from the interdepartmental research seminar "Energy Research in  $\gamma$  Sciences" at the Energy and Sustainability Centre, University of Groningen, which took place on June 17, 2013.
- 3. The Binding Study Advice means that a first-year student has to earn a minimum amount of ECTS in the first year. If this amount is not achieved, the student cannot continue the program.
- 4. All existing definitions of sustainability include more than one and usually at least three dimensions see Brundtland report, OECD, Triple-P, etc.
- In June 2015, The University of Groningen climbed up the list of the most sustainable institutions of higher education in The Netherlands, the SustainaBul. It now takes the fourth place and has won a gold status.

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340

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