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Educational Process in the Interests of Sustainable Development: World Experience

Abstract

Main problem: Implementing Education for Sustainable Development (ESD) in Higher Education Institutions (HEIs) is critical to facilitating the transition to sustainable development. However, little is known about the specific implementation processes that lead to the institutionalization of sustainability curricula in higher education institutions. This study cross-sections a number of international case studies using cluster analysis to clarify and highlight different implementation models: collaborative paradigm change; evolving institutional change from the bottom up; mandatory top-down institutional changes; externally driven initiatives; isolated initiatives and limited institutional changes.

Purpose: Using cluster analysis, it is necessary to identify the different stages of ESD implementation, which can be implemented from the bottom up, top down, or both, identifying incentives that can come from a variety of external or internal stakeholders.

Methods: In order to gain more general knowledge about the role of various drivers and barriers discussed in the literature, as well as specific implementation models, a comparative case study was conducted using a thematic review method. Cluster analysis was used to analyze the transformed data. The case study method is a meta-analytic method for systematically synthesizing and comparing different case studies using a specific coding scheme that converts qualitative data into quantitative data.

Results and their significance: A cross-case analysis was conducted to better understand the sustainability curriculum delivery patterns that are common across different contexts. Most institutions and practitioners can benefit from these findings by defining a specific implementation framework for their institution, focusing on the most important and meaningful components of a particular university's ESD implementation model.

Key words: education for sustainable education; higher education; international models and practices; universities; curriculum changes; reforms.

Introduction

Higher education institutions (HEIs) are crucial for facilitating the transition to a sustainable society and the environment [1]. One of the contributions of higher education can be to create a brighter future through the education of students (decision makers of tomorrow), thereby providing them with the opportunity not only to develop competencies in the field of sustainable development [2], but also to critically reflect on their values and apply these values and knowledge in their future work and life.

In order to promote the implementation of education for sustainable development (ESD) in universities, a powerful impetus was provided by the United Nations (UN) through its policies and programs in 2005-2014, as well as subsequent (2015-2015) in 2019, the Global Action Program (GAP) [3] and the Sustainable Development Goals (SDGs) through the sub-task of SDG 4.7., which states that by 2030 it is necessary to “ensure that all students acquire the knowledge and skills necessary to promote sustainable development, including through education for sustainable development ...” [4]. Currently, the ESD Roadmap for 2030 contains recommendations for further implementation of ESD in universities [5].

In higher education institutions, ESD can be integrated at the micro level through teaching and learning courses [6] and at the macro level through programs and curricula [7]. Various (mostly isolated) case studies have made it possible to understand how such integration can be successful.

However, exactly how sustainable development curricula are developed and how true institutionalization takes place remains unclear.

The processes of implementing sustainable development curricula are defined as "... the development and implementation of new approaches to teaching and learning (courses, programs) in the paradigm of education for sustainable development, as well as the recognition of sustainability as a cross-cutting topic in existing curricula" [8]. If ESD is defined as education in the field of sustainable development, then a paradigm shift should be at the heart of sustainable development curricula, which is not only reflected in university teaching, but also permeates the entire educational institution. Thus, throughout this study, there are also connections to three other areas, namely research, outreach, and university sustainability, as well as how these areas relate to teaching. In this context, the implementation process is defined as an institutional one that includes various internal and external driving forces and barriers.

The processes of curriculum change are complex and vary significantly from institution to institution in breadth, depth and impact. Understanding such complex processes of implementing sustainable development curricula is based on knowledge from various fields and disciplines and synthesizes them. The most frequently mentioned, although not exclusively, are: theories of general curriculum change, organizational change and innovation [9], transformational change [10], social dynamics and cultural changes with increasing attention to learning organizations and adaptive rather than progressive changes [11,12], as well as Meadows' points of influence for intervention in the system.

Among the various theories, five interrelated elements are considered the most important:

Firstly, the type of ESD implementation in the curriculum is conceptualized by different scientists in different ways. Lambrechts et al. [13] distinguish between vertical implementation (explicitly focused on sustainability), horizontal implementation (sustainability elements are implicitly integrated) and combined implementation, whereas Barth [8] emphasizes the difference between disciplinary, interdisciplinary and transdisciplinary approaches to implementation.

Secondly, the level of depth of the curriculum change was further clarified by various authors. Sterling and Thomas [14] describe four levels of change in the curriculum for sustainable development: denial (unchanged), "attachment" (learning sustainable development), "embedding" and redesign, redesign. Negation describes a lack of change, "attachment" describes sustainability issues that inform disciplinary topics by integrating sustainability into existing courses or programs, "embedded" describes sustainability that is addressed in interdisciplinary collaboration through new or interdisciplinary sustainability courses or programs, and redesign describes the integration of sustainability into common core requirements or the concept of the vision of a higher educational institution.

The third area of research focuses more on the stages and dynamics of curriculum change. Lattuka and Stark [15] distinguish three stages: initiation, selection and attraction, while others propose four stages of successful implementation, which range from basic and special measures for sustainable development to inter- and transdisciplinary cooperation between many stakeholders. This time perspective also includes the concepts of the history and traditions of universities as additional factors influencing the implementation of ESD, since certain traditions can lead to the preservation of a certain profile, thereby preventing further innovations or the introduction of new disciplines.

The momentum of change is the fourth aspect of ESD implementation that scientists pay attention to. Lattuka and Stark [15] distinguish between internal and external incentives, although they distinguish between the motivation for changing the curriculum, which is either normative or purposeful. Other authors also emphasize the importance of intrinsic motivation and consider the underlying assumptions and reflections on these assumptions to achieve the full implementation of sustainable development curricula [11].

Finally, the dominant area of research is related to the identification of specific driving forces and obstacles affecting the implementation of the curriculum on sustainable development. This research includes literature reviews, logical models [8], descriptive and analytical case studies [16], comparative case studies and surveys based on a larger number of universities [17]. The list of drivers and obstacles is extensive and includes internal and external stakeholders with unique sources of motivation, different perceptions of sustainability and change, different basic assumptions about ESD, as well as various organizational tools (for example, a strategic plan and participation mechanisms).

Judging by the case studies published so far, all the processes of changing curricula in universities seem to be unique and include an individual context and history, which makes it difficult

both to make comparisons and the ability of universities to learn from each other. However, referring to the existing lists of what are perceived as common driving forces and barriers, as well as against the background of theories of change processes, scientists rightly raise the question of whether there are patterns among similar processes of changing curricula on sustainable development. Moreover, various authors have provided recommendations on successful change processes, assuming that there are comparable processes of planned changes.

So far, little attention has been paid to the relationship between influencing factors and specific models for implementing higher education for sustainable development. Nevertheless, it is necessary to further develop the theory by considering the interaction of various driving forces and barriers, the interrelationships between the various above-mentioned aspects (type of implementation, level of depth, stages and dynamics, incentive for change, driving forces and barriers), as well as the problems of generalization.

To fill this research gap, we conducted a meta-analysis of international case studies and focused on the form, scope and role of the interaction of drivers and obstacles to ESD in specific implementation models. At the same time, we linked patterns with the level of change and the type of integration, and — to the extent that the primary data can provide insight — we identified the source of the changes by placing factors within the process. Thus, we have sought to contribute to a better understanding of the implementation processes underlying ESD by obtaining information on the following issues:

- How are changes taking place in the curriculum for sustainable development in universities?
- What interrelated factors lead to what level of implementation?

Materials and methods

In order to gain more generalized knowledge about the role of various driving forces and barriers discussed in the literature, as well as about specific implementation models, a comparative case study was conducted using the thematic review method. Cluster analysis was used to analyze the transformed data. The case study method is a meta-analytical method for the systematic synthesis and comparison of various case studies. Additional materials were taken from the relevant websites of universities. To convert qualitative information into quantitative data, variables were used that included detailed operationalization. Variables were predominantly classified as (a) barrier (absence/weak), (b) medium (described but with unclear/varying effects), (c) driving forces (high/strong), (d) others (if no category matched the description) or (e) not described (there is no information available). The level of implementation (depth) was measured using the Sterling and Thomas classification [14], using the categories of negation, “attachment”, “embedding” and redesign. To check for specific patterns, a cluster analysis was performed to group all cases based on the relevant variables. Variables that showed no variance or almost no variance were excluded. An analysis was then performed to determine which variables were characteristic and significant for a particular group. This method allowed us to identify groups that could be meaningfully explained using specific variables.

Results

The cluster analysis revealed six specific models of the processes of implementation of educational programs on sustainable development, which can be found in universities. Each template takes into account the type of integration, the level of implementation, the dynamics and stages of the implementation process, the momentum of change, as well as additional driving forces and obstacles. These factors are structured into five categories: institutional environment, educational environment, internal stakeholders, external influences and areas of sustainability in higher education.

Six analytical models for the implementation of educational programs on sustainable development in universities, which are identified as a result of the analysis of international case studies based on cluster analysis.

Cluster 1: changing the paradigm of cooperation.

The first cluster represents cases in which the entire curriculum of an educational institution ensures sustainability after a revision of the approach characterized by numerous relationships and connections. The key features of this model are fruitful collaboration and support from all internal and external stakeholders, a formal participation process, a widely accepted guiding vision statement, and the implementation of sustainability in education, research, campus activities, and outreach, leading to an overall paradigm shift. Scientists call this type of integration a “general institutional approach” in which sustainable development is institutionalized in all areas at the heart of the university.

Innovators on sustainable development in higher education institutions give impetus to the implementation of ESD. The implementation of ESD is additionally supported externally by a wide range of stakeholders, which leads to a sense of urgency due to increased external pressure and the creation of coalitions of various internal and external stakeholders. Although early actions can be carried out both from the top down and from the bottom up, leadership commitment at an early stage is also a common characteristic of this model. Such support from senior management provides a formal collaborative vision process that defines the goals of ESD for higher education institutions with community involvement. The result of such participation is a formalized statement of vision and strategy, which are implemented and further monitored by the quality assessment system. The organizational structure is adapted accordingly to implement the strategy. Dedicated resources such as funding, teacher training, ongoing dialogue-oriented communication, and collaboration ensure a long process of change.

In most cases, this type of implementation is carried out either through a distributed leadership model or through an inter-faculty steering group that ensures the participation of all services and departments. Over time, the synergy between research, education and university activities is being explored and exploited. Formal teacher training, interdisciplinary spaces (such as the Faculty of Sustainable Development and interdisciplinary centers), communities of practice and teacher internship programs are among the various measures used to support the redesign approach in the implementation of sustainable development curricula.

Cluster 2: Evolving institutional changes from the bottom up.

The second cluster includes cases with upward, value-oriented changes that go beyond the initially expected or planned level of implementation, leading to a redesign of the implementation level of the sustainability curriculum with periodic embedded trends. These cases are characterized by bottom-up initiation and a high level of internal informal cooperation, while the support of senior management is connected at a later stage of the implementation process, which leads to more formalized support and cooperation.

Students or teachers begin the process by requesting and including the first courses and ESD programs in only a few departments. These initiatives often start with environmental projects.

In order to accelerate implementation and ensure a critical mass of supporters, an informal facilitation strategy is applied, characterized by knowledge sharing through informal communication arenas (for example, the community of practice approach, digital exchange and learning platform) in order to find solidarity among the student community and share resources for the implementation of ESD. Since the support of the presidential leadership and the allocated financial resources are quite weak at this stage, methods such as cost-sharing with the city are used to distribute (mostly external) funding. After the first stage, initially rather weak support from senior management turns into more support due to a change of the management team or awareness raising. As a result, the assistance strategy moves from a bottom-up initiative to a formalized strategy and assistance, more supported by management. Communication and support mechanisms (for example, professional development), periodic participation of internal and external stakeholders, as well as quality assurance mechanisms have been formalized. In most cases, ESD is also outlined in the institution's vision statement. Over time, sustainability is established in the fields of education, research, campus activities and outreach, while from time to time there are synergies between the fields.

Cluster 3: Top-down, mandatory institutional changes.

The third cluster includes cases sanctioned by senior management, with opportunities to promote deeper cultural change based on values, leading mainly to embedded implementation. The cluster is characterized by initiation and execution by senior management, as well as a low sense of responsibility of the teaching staff, that is, less motivation and responsibility for the implementation of ESD.

External motivation, such as government demands, the need to restructure a higher education institution, or the desire for a competitive advantage, gives impetus to change. As changes are planned from the top, a strategic plan is being developed, a coordination unit is being created and some support mechanisms are being proposed. University management only partially includes ESD in university vision statements (i.e. in 50% of cases), and the focus is often on the environmental aspect of sustainability. The formal participation of internal stakeholders (teachers, students) is only partially established, which leads to insufficient participation of the campus community, lack of effective communication and lack of a unified and guiding vision statement. This lack of participation often leads to teachers' resistance to the introduction of ESD and to a lack of a sense of ownership, since the

opinion of teachers is not taken into account. In some cases, it is reported that professional development opportunities or informal communication (for example, over a cup of tea) help to cope with the resistance of teachers, which helps to mitigate resistance to the introduction of ESD. In other areas of the university's activities, environmental sustainability is implemented in research and campus activities, as well as, to a lesser extent, in awareness-raising activities, and in this case less synergy is created between the aforementioned university areas and courses on sustainable development. Cluster 4: Initiatives implemented from the outside.

The fourth cluster includes cases with weak internal support, which is compensated to a certain extent by strong external support, which leads to a built-in implementation level. This model of implementing a sustainable development curriculum is characterized by weak internal support and planning, as well as a strong external driving force.

The external incentive supports the initial stage of changing the curriculum on sustainable development, as internal support is weak. The lack of internal support is also reflected in the lack of description of many variables such as strategic plan, leadership, collaboration, coordination, communication, incentives and organizational structure. However, two different subgroups can be distinguished, related to different processes of overcoming the lack of internal support:

1) The first subgroup includes cases where ESD is implemented mainly at the programmatic level with the support of (international) national networks (i.e. research cooperation with other universities or teaching cooperation, such as a joint distance lecture program) or regional expert centers. Close external cooperation and coordination play a key role here. Within the university, this process is managed by supporters of sustainable development. Further connections of the structural divisions of the university are poorly marked. However, in 50% of cases, ESD is envisaged in subsequent years in the form of a vision statement (data are posted on relevant websites), which may indicate that external cooperation can lead to a more integrated implementation of the sustainable development curriculum.

2) The second subgroup includes cases of attracting external incentives by universities for the implementation of ESD, which come from the government of some countries, for example, India, in this country they were implemented. The demand for ESD comes from the country's industrial sector. Since Environmental Education (EE) is compulsory for every undergraduate student in India, the integration approach chosen by universities is a compulsory discipline for all undergraduate students. In order to cope with weak internal support, weak interdisciplinary competence of teachers in teaching EO or ESD, as well as conflicting perceptions of possible links between EO/ESD and existing disciplines and courses, the change and rethinking of the curriculum is supported by stakeholders outside the university.

Cluster 5: individual initiatives.

The fifth cluster consists of cases where initiatives have difficulty interacting with each other and are accompanied by weak prioritization, which leads to embedded or accelerated implementation. The cluster is characterized by the participation of a small number of stakeholders, as well as weak coordination and inter-faculty cooperation, which leads to isolated initiatives.

ESD initiation occurs either from top to bottom or from bottom to top. Motivation for the implementation of ESD varies and may be driven by values, on the one hand, or external motivation through government support or international research projects, on the other hand. After the start of ESD efforts, management support ranges from moderate to strong. For some cases, an implementation strategy is being developed in the cluster, although without specific steps and without a quality assessment or with a weak assessment. Broader stakeholder participation is rather weak, resulting in a lack of a unified vision statement. Moreover, universities are characterized by a competitive environment with competition between various stakeholders and university fields. The lack of interdisciplinary competence and collaborative faculty - combined with the lack of an integrative structure to coordinate and support efforts - leads to fragmented and isolated approaches to ESD implementation, led by few advocates of sustainable development. Externally, awareness of ESD among the local community and industry is quite low. However, some external support comes from international research projects or partnerships with other universities, as well as from government support.

Sustainability in other areas of the institution's activities is quite low: most of the activities are related to information and educational work, followed by research, and there is no activity on the territory of the university. External teacher training, student courses, and certificates represent integration approaches that can only be one-time offers.

Cluster 6: Limited institutional changes.

The sixth cluster consists of cases where activities are carried out on a bottom-up basis, and it is difficult for them to establish their activities on a permanent basis due to many obstacles and lack of support, which leads to a transitional level of implementation. The number of barriers described — that is, weak support from various stakeholder groups, untapped momentum, and the inability to establish long-term internal cultural change - is a key factor characterizing this cluster.

The incentive to implement ESD comes from a value-based and bottom-up motivation. As supporters of sustainable development struggle to gain additional support, this process is characterized by many obstacles. For example, the lack of a strategic plan, weak leadership support, weak interdisciplinary competence of teachers teaching ESD, different levels of acceptance of ESD by students, lack of any formal stakeholder participation, weak internal cooperation, weak professional development opportunities, lack of incentives and resources, as well as weak implementation in other areas of the institution hinder more active implementation of ESD. Externally, the Government acts as a driving force for ESD by setting international and national guidelines.

Two different subgroups can be distinguished within this cluster:

1) The first subgroup includes cases in Vietnam where the level of implementation of the curriculum on sustainable development has been achieved. In some cases, an additional incentive for the implementation of ESD is provided either by severe environmental shocks in the environment of the region of residence, or by the National Action Plan for Sustainable Development, or by UNESCO initiatives. However, the potential lack of both cultural understanding of ESD and traditional approaches is a strong obstacle to the implementation of ESD.

2) The second subgroup includes cases with a long and diverse history of ESD implementation, characterized by many obstacles. In these cases, a built-in approach driven by proponents of sustainable development is often used. The varying levels of management support, the lack of a detailed strategy, partly insufficient coordination and poor communication are strong barriers to ESD. In only one case, the study was able to identify a case to achieve a more complete implementation of ESD due to broader support, including due to the change of senior management, as well as the formalization of ESD in the strategic plan of the university.

Discussion

A study of the activities of universities involved in the implementation of ESD has provided generalizing results on specific models of the processes of implementing educational programs on sustainable development. The analysis and comparison of the six derived clusters sheds light on the role of specific variables that act either as an incentive or as a barrier to the implementation of ESD, depending on the specific context. These clusters play an important role in describing specific models, as well as in stimulating or hindering the full implementation of sustainable development training programs.

However, these initiatives are limited. First, most of the cases represent the processes of implementing sustainable development training programs only in individual countries and, thus, represent an unbalanced global picture. Secondly, comparing case studies as secondary data has various limitations, including the use of different perspectives and methodologies in publications. For example, there are many universities in India that have implemented ESD programs. Therefore, we want to emphasize that this study covers only universities with published case studies containing qualitative data and information about the studied time periods. Such research has limitations when it comes to reflecting today's reality, but it provides an opportunity to understand the links between influences and their impact at the time of the relevant publication dates. Follow-up studies with expanded data collection through surveys or interviews will provide additional data.

Third, because many case studies are reported by universities themselves, there is a bias against success stories that excludes barriers, failures, idiosyncrasies, and influences. Fourth, when conducting an analysis, it is difficult to trace the dynamics of changes in the educational process over a long period of time due to insufficient information. In some cases, we could only get a general idea of the process of implementing the sustainable development curriculum, but how exactly specific processes developed was often unclear. Finally, clusters 4 and 6 included a comparative case study, which accounted for a significant proportion of cases in these clusters. In these cases, it would be desirable to have a broader database to confirm the existence of subgroups of implementation processes defined in these clusters. However, the data show a general trend towards a more comprehensive implementation of the sustainable development curriculum based on the number of cases.

Additional research has shown that such a more comprehensive implementation is easier to achieve in small universities.

The question of whether different ESD models arise in different countries is also relevant. Local conditions may represent special cases if certain traditions prevail, if the regions under study have been affected by environmental disasters, or if national guidelines provide for certain boundaries or support. No significant differences were found between countries in terms of specific models or level of implementation.

When comparing ESD implementation models, it becomes clear that they often have a common set of variables (although these variables differ in form and degree), which further affects the achieved level of implementation of training programs on sustainable development. These variables affect the implementation of sustainable development training programs in two separate phases.

Stage 1: Launch of the sustainable development training program.

All stakeholders can initiate changes to the sustainable development curriculum: within clusters, various internal and external stakeholders can be found who can initiate the full implementation process, including students, teachers, management and external stakeholders (e.g. international researchers). Internal stakeholders are stronger than external stakeholders in bringing about change in higher education institutions. The actions of proponents of sustainable development, such as teachers and students, can become more widespread if they are taken seriously and if they are not seen as competing with ESD initiatives initiated by senior management. However, if internal leaders lack broader internal support to advance implementation, external support is useful to compensate for the lack of internal support. This support and knowledge sharing can take the form of partnerships with networks, research projects, or regional expert centers. Moreover, an external incentive may be most useful for a deeper internal recognition of the need not only to support change, but also to begin the process of implementing ESD. For example, local authorities may exert pressure at the leadership level, new government regulations may be established, or local awareness may increase due to environmental disasters such as earthquakes. It was found that government support contributes to the implementation of ESD in all areas, but for a more comprehensive implementation, greater influence is needed – especially internal support from the teaching staff, communication and coordination. These findings confirm the findings of previous studies. For example, Hoover, E., Harder, M.K. [11] found that curriculum change is initiated by many different stakeholders and occurs at different levels (higher, middle, grassroots) and depends on the perception of who has the right to influence the changes.

The implementation of educational programs on sustainable development can begin with individual initiatives in the field of education, the activities of faculties, departments, research or awareness-raising activities: it has been found that within the models, the incentive to implement sustainability in education often has its starting point in other areas of the educational institution. For example, a higher education institution that pays special attention to a sustainable campus management system often at some point expands the topic of sustainable development to an educational area after students have expressed interest in receiving additional information about initiatives in environmental, social, and economic areas through courses and programs. Another possibility for implementing sustainable development curricula is to transfer them from the field of research to the field of education, which can begin as part of a joint project with external or inter- or transdisciplinary partners. Other studies have also shown that it is useful to involve all departments of a higher education institution in the implementation of sustainable development topics in order to achieve a more comprehensive implementation of the sustainable development curriculum.

Stage 2: Achieving and maintaining a more comprehensive implementation of ESD.

Communication is the key to gaining a critical mass of supporters: it has been found that ESD implementation models vary in the forms and scale of communication and participation initiatives. A more comprehensive implementation is always accompanied by a communication and participation strategy designed to create a sense of ownership, formalize changes in a single guiding vision statement and ensure a lasting effect. It doesn't matter which group of stakeholders starts the communication process; However, at some point, the formal, broad communication process supported by the institution's management becomes more effective, as it can turn into a formal process of participation and decision-making. The more seriously communication is considered as a two-way process with an emphasis on mutual feedback and participation, the higher the level of implementation of the sustainable development curriculum will be achieved, since this implementation helps to create an understanding of sustainability and a desire for its integration. Useful tools in this process may

include launching an awareness campaign, creating communication platforms, launching a web portal that provides feedback on the strategic plan, and facilitating a shared vision process. Interdisciplinary spaces allow for a more comprehensive implementation of the curriculum on sustainable development, but must be supported by management. Where such formal communication measures are not available, informal opportunities for leaders to share knowledge and motivate each other can serve as partial compensation.

These results are consistent with previous studies that have highlighted the role of communication in the processes of change. Promoting open communication and transparent decision-making is equally important for building trust among the university community. Finally, a paradigm shift is not just a change in behavior, but rather a change in mental models, and knowledge sharing and communication form an important part of learning [11]. It is noted that dialogue and reflective practices are the key to recognizing tension and managing the process of change.

Collaboration within and between stakeholder groups is the key to a more integrated implementation and balancing lack of support or resources: collaboration is identified as a major factor in a more integrated implementation. Close internal cooperation and knowledge sharing can enhance solidarity among all stakeholders.

External cooperation can to some extent compensate for the lack of broad internal support for the implementation of ESD by supporting individual proponents of internal sustainability. For example, universities with weak local support often form partnerships with (international) national universities, networks or regional expert centers through (joint) research projects. The data point to the fact that such external cooperation can serve as an important starting point for a more comprehensive implementation of ESD, since in 50% of these cases ESD is implemented in their current vision.

Cooperation can be identified not only between stakeholder groups, but also between university fields (research, university activities, advocacy). The more internal and external stakeholder groups are active (participation, cooperation and support) in the process and the more the various structures of higher education institutions are involved, the more complex the implementation (paradigm shift) is.

The important role of cooperation and cooperation, as opposed to competition and the participation of a wide range of stakeholders, has also been emphasized by further research [18]. Comparing 7 universities, it was found that cooperation in the form of a network of experts – or stakeholders – who connect higher education institutions with society, serves as a driving factor in the implementation of ESD. Collaboration helps break down internal boundaries, as meeting new people leads to learning and reflection on one's own assumptions and values.

Coordination saves resources, helps to create synergies and allows you to track progress. Another key variable in achieving a more integrated implementation of the sustainable development curriculum is the availability of any type of coordination, for example, the division of responsibilities between faculties or the appointment of a position or committee to coordinate the implementation of ESD throughout the educational institution.

A formalized strategic plan with clearly defined steps for a longer period of time helps clarify the desired vision, which then contributes to stronger and ongoing support from all stakeholders. Coordinated quality assurance mechanisms are one of the tools that can be used to assess current changes in the sustainable development curriculum and plan further steps for more integrated implementation. Moreover, the coordination supported by the institution's management should ensure that initiatives within the same institution are not repeated and do not compete for the same resources. In various cases, it has been found that close collaboration can compensate for the lack of financial, human or time resources by providing creative and effective knowledge sharing, and that this collaboration can encourage internal stakeholders to seek a variety of solutions. Moreover, the coordination and integration of many ESD initiatives create synergies and conditions that make it possible to redesign training programs on sustainable development, which would not be possible with the help of individual initiatives. For example, at the educational level, more innovative approaches to learning are possible, such as live labs, community partnerships, and real-world projects.

The role of coordination has also been identified in other studies on curriculum change. Hoover E and Harder M. [11] noted that "structures should be diverse, developed and managed in such a way as to provide flexibility, support (rather than manage) change processes, and value different types of leadership." Moreover, the processes of changing curricula for sustainable development should be considered as a form of a double cycle of learning within an organization, and the essence of

the process of change should consist of reflecting existing values and analyzing existing programs and structures.

Given the different models and characteristics of key influences, it remains unclear whether universities will be able to move from one model to another and how they can move to a model with a more comprehensive implementation of ESD. It is important to note that, despite the generalizing factors of influence, the implementation processes are tied to an individual context. Thus, models can be viewed as different processes used to institutionalize sustainable development curricula, rather than as different stages that a university must go through. However, there are important relationships between the key factors of influence and how the management of these influences leads to various stages of implementation. Indeed, universities can switch from one model to another, but this is not necessary. For example, a well-managed change process can move very quickly to the redesign stage without going through any other stages or templates. Moreover, in order to achieve a more comprehensive implementation of ESD, the university may think about its current model. By examining the key factors and comparing how they operate in another model, it is possible to determine the next strategic steps to move to another model, for example, requiring more formal participation of internal stakeholders and developing a common vision.

Conclusion

The analysis of case studies revealed six different models of the processes of implementing sustainable development training programs, which range from a joint paradigm shift (redesign) to limited institutional changes. However, some models seem more favorable for a more comprehensive implementation, especially at the stage of formation, creation, where there are several implementation methods, including an ascending and descending process to achieve full implementation. Comparing these processes of implementing sustainable development curricula, we have identified five key factors influencing the implementation of sustainable development curricula in universities:

1) The incentive to change during the start of ESD implementation can have many sources, including internal or external stakeholders with different levels of decision-making authority (teachers, students, management, external persons) and various areas of higher education (research, educational work, awareness-raising, education).

2) Communication, understood as information, mutual feedback, participation and reflection on one's own assumptions and values, is the key to gaining supporters to support the implementation of ESD. Informal communication can compensate for the lack of formal communication and professional development.

3) Creating a sense of ownership through a single guiding vision and strategy document through the broad participation of internal and external stakeholders (who take into account different points of view and develop a common and comprehensive understanding of ESD and the desired vision statement of the university) contributes to a more comprehensive implementation.

4) Seeking collaboration and coalitions with many internal and external stakeholders, as well as with university fields (research, outreach) - even with fields with different sources of motivation – is crucial for sharing knowledge and resources, ensuring widespread change and creating synergies with mutual benefit. External coalitions can compensate (to a certain extent) for the lack of internal support.

5) Coordination of various initiatives saves resources by combining individual ESD efforts and creating synergies between them. A more comprehensive implementation can be achieved by reflecting on the usefulness of organizational structures, as well as by changing them and monitoring these processes.

Since qualitative data is the main source used in this study to further explore ESD implementation models, future research should focus on the quality of individual or comparative case studies and take into account the many variables that affect the implementation of ESD in higher education institutions. To do this, it is extremely important to determine (1) which factors influence and which do not affect the implementation of ESD. The relationship between factors is often underrepresented in current research, and future research should make the coping strategies used to respond to barriers more explicit and accessible in order to ensure the exchange of experience between universities. Similarly, case studies should more carefully reflect specific contexts in terms of traditions, organizational culture, countries, etc. For example, using case studies, it was difficult to determine when and how global ESD initiatives, such as the UN Decade, influenced the implementation of training programmes on sustainable development. The references in the case studies were mostly very general, although the publication dates of many of the case studies coincided

with the UN Decade. However, further research may focus on more accurately tracking and understanding such influences. Moreover, more attention should be paid to data collection and analysis of the multiple points of view of various stakeholders and their specific underlying assumptions. In addition, future research should more clearly delineate (2) the different stages of the ESD implementation process (for example, to determine when a specific impact is important). Finally, future case studies should more accurately explain (3) the changes achieved and the level of implementation of ESD.

In addition, the continued inclusion of case studies on the implementation of ESD in the theory of curriculum change should contribute to understanding the specific patterns of curriculum change in the field of sustainable development.

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Образовательный процесс в интересах устойчивого развития: мировой опыт

Негізгі мәселе: Жоғары оқу орындарында (ЖОО) орнықты даму үшін білім беруді (ТББ) енгізу орнықты дамуға көшуді жеңілдету үшін маңызды. Дегенмен, жоғары оқу орындарында тұрақтылық бойынша оқу бағдарламаларын институттандыруға әкелетін нақты іске асыру процестері туралы аз мәлімет бар. Бұл зерттеу әртүрлі іске асыру үлгілерін нақтылау және бөлектеу үшін кластерлік талдауды пайдалана отырып, бірқатар халықаралық жағдайлық зерттеулерді кесіп өтеді: бірлескен парадигманы өзгерту; төменнен жоғары қарай дамып келе жатқан институционалдық өзгерістер; міндетті жоғарыдан төмен институционалдық өзгерістер; сыртқы бастамалар; оқшауланған бастамалар мен шектеулі институционалдық өзгерістер.

Мақсаты: Кластерлік талдауды пайдалана отырып, әртүрлі сыртқы немесе ішкі мүдделі тараптардан келетін ынталандыруларды анықтай отырып, төменнен жоғарыға, жоғарыдан төменге немесе екеуінен де жүзеге асырылуы мүмкін ТҚБ енгізудің әртүрлі кезеңдерін анықтау қажет.

Әдіс-тәсілдер: Әдебиеттерде талқыланатын әртүрлі драйверлер мен кедергілердің рөлі, сондай-ақ нақты іске асыру үлгілері туралы жалпы білім алу үшін тақырыптық шолу әдісін қолдану арқылы салыстырмалы жағдайды зерттеу жүргізілді. Трансформацияланған деректерді талдау үшін кластерлік талдау қолданылды. Кейс-стади әдісі – сапалы деректерді сандық деректерге түрлендіретін арнайы кодтау схемасын пайдалана отырып, әртүрлі жағдайлық зерттеулерді жүйелі түрде синтездеуге және салыстыруға арналған мета-аналитикалық әдіс.

Нәтижелер және олардың маңызы: Әртүрлі контексттерде ортақ тұрақтылық бойынша оқу бағдарламаларын жеткізу үлгілерін жақсырақ түсіну үшін кросс-жағдайлар талдауы жүргізілді. Көптеген институттар мен практиктер белгілі бір университеттің ТЖБ енгізу моделінің ең маңызды және мағыналы құрамдастарына назар аудара отырып, олардың институты үшін нақты іске асыру шеңберін анықтау арқылы осы нәтижелерден пайда көре алады.

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Образовательный процесс в интересах устойчивого развития: мировой опыт

Основная проблема: внедрение образования для устойчивого развития (ОУР) в высших учебных заведениях (ВУЗах) имеет решающее значение для содействия переходу к устойчивому развитию в странах. Однако мало что известно о конкретных процессах реализации устойчивого развития, которые приводят к институционализации учебных программ по устойчивому развитию в вузах. В этом исследовании приводится с использованием кластерного анализа срез по определенному количеству международных тематических исследований, чтобы прояснить и выделить различные модели реализации: совместное изменение парадигмы; развивающиеся институциональные изменения снизу вверх; обязательные институциональные изменения сверху вниз; инициативы, движимые извне; изолированные инициативы и ограниченные институциональные изменения.

Цель: Используя кластерный анализ необходимо выявить различные этапы реализации ОУР, которые могут реализовываться снизу вверх, сверху вниз или и то, и другое, с

выявлением стимулов, которые могут исходить от множества внешних или внутренних заинтересованных сторон.

Методы: с целью получения более обобщенных знаний о роли различных движущих сил и барьеров, обсуждаемых в литературе, а также о конкретных моделях реализации, было проведено сравнительное тематическое исследование с помощью метода тематического обзора. Для анализа преобразованных данных был использован кластерный анализ. Метод тематического исследования – это метааналитический метод систематического синтеза и сравнения различных тематических исследований с помощью определенной схемы кодирования, которая преобразует качественные данные в количественные.

Результаты и их значимость: был проведен анализ, представляющий собой срез по тематическим исследованиям, для лучшего понимания моделей реализации учебных программ по устойчивому развитию, которые являются общими в различных контекстах. Большинство вузов и практиков могут извлечь выгоду из этих выводов, определяя для своего учебного заведения конкретную схему реализации, сосредоточив внимание на наиболее важных и значимых составляющих модели реализации ОУР в конкретном университете.

Ключевые слова: образование для устойчивого образования; высшее образование; международные модели и практики; университеты; изменение учебной программы; реформы.

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