INCREASING THE STUDENTS' INTEREST IN SCIENCE BY IMPLEMENTING A SCIENCE ACTION DEDICATED TO PLASTICS BIODEGRADABILITY

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Abstract

Science actions represent specific initiatives and demarches that involve investigation, experimentation, and even research, for raising the interest of the young generation in science, through particular approaches of STEM education. Important topics are promoted to students in various approaches, addressing nowadays problems, answering scientific questions, or trying to make them aware of sensible issues. In this respect, the topic of plastics biodegradability embraced the clothes of a Science action, a format based on the Care-Know-Do model, proposed in the frame of the CONNECT project. Having the view to evaluating the students' interest in science after the implementation of the project-designed science actions, the partnership proposed a 5-point Likert scale instrument. In Romania, 373 students who participated in the Biodegradable Plastics action expressed their feedback, underlining - in an important proportion - their strong confidence in science, being ready to participate in collaborative science projects or benefit from their family support who consider that understanding and knowing science is useful for the entire life. Moreover, the students offered positive feedback related to teachers' ability to emphasize the importance of science for their life and future, but also in society, in general.
Keywords: *STEM education, science action, plastics biodegradability, students' feedback, CONNECT project*

Introduction

Plastics have been widely used since the day they were invented because of their remarkable properties in terms of durability, lightness, stability, and low cost, with global plastics production reaching 348 million tons in 2017 (PlasticsEurope, 2018). The durability and strength of plastics are two-sided; those properties can not only improve the performance of the material but also pose a serious threat to the environment by making the material resistant to natural degradation. This resistance has become a big challenge in the waste management process, especially in the field of sustainable waste management. A large amount of plastic waste has been and is being dumped into the environment worldwide causing the current problem of "white pollution" (Dauvergne, 2018). "White pollution" represents a term associated with the image of the phenomenon of environmental pollution by plastic waste and refers to the pollution of the ecosystem caused by using plastic products such as packaging bags, mulch film, disposable tableware, plastic bottles, etc. made of polyethylene (PE), polypropylene (PP), polyvinyl

chloride (PVC) and other high molecular weight compounds that constitute solid waste (Shen et al., 2020).

The growing awareness and concern over plastic pollution led to an interest in making plastics that have the potential to degrade the environment (Guillet, 2002). The term "biodegradation" is still not firmly defined, and the field of study covers many interdisciplinary aspects. Moreover, experimentation and testing are challenging because research studies need to address complex and long-term phenomena in natural environments that are extremely variable (SAPEA, 2020). At the heart of the issue is the contrast between polymers made in nature and those that have been developed by human society. Biodegradable, compostable, and bio-based plastics are increasingly promoted as a solution to some of those challenges. The growth in biodegradable plastics is related to the growing societal concern about the accumulation of conventional plastics in the open environment and the associated ecological risks, and impacts on ecosystem services and society (SAPEA, 2020).

There are still questions as to whether biodegradable plastics can be a promising solution to the problem of waste disposal and global pollution due to plastic. Accordingly, there can be pointed out three main scientific arguments/evidence (SAPEA, 2020). Firstly, it is well known that biodegradable plastics are not currently a substitute for most conventional plastics. Secondly, the production of biodegradable plastics appears to be much easier than their treatment. Third, awareness of human behaviour is important. The solution to global plastics pollution requires a change in awareness of human behaviour combined with promising viable approaches, and the latter will be largely ineffective without the former. There is considerable confusion regarding the public understanding surrounding the terminology used to describe bioplastics in general and biodegradable plastics. The generic term "bioplastics" is used to refer to plastics that are partly or fully produced from biological raw materials ("bio-based plastic") as well as to those that are considered biodegradable, including plastics that are compostable or home-compostable ("biodegradable plastic") (SAPEA, 2020). The "bio" prefix draws consumers' attention and is suggestive of sustainability and environmental protection (Yeh et al., 2015). Accordingly, consumers associate the terms "bioplastics" and "bio-based plastics" with vague notions of renewability, natural origins, and "environmental friendliness". They also confuse or conflate them with end-of-use characteristics, such as biodegradability, compostability, and recyclability (Notaro et al., 2022). Consumers expect products or packaging that are labelled as bioplastic to have a renewable resource base and to fully degrade under home composting conditions, and that they can help with climate change mitigation and plastic waste reduction (Magnier & Crié, 2015; Dilkes-Hoffman et al., 2019b; Neves et al., 2020). While consumers generally know something about the availability and production of bioplastics, they lack a detailed understanding of different material types as well as their applications and environmental impacts (Dilkes-Hoffman et al., 2019a). This can partially be attributed to the limited relevance of bioplastics in consumers' day-to-day lives (Klein et al., 2019).

Behavioural aspects are important both in respect of the uptake and disposal of biodegradable plastics. Gabriel and Menrad (2015) showed that most consumers will choose the standard/conventional plastic one, even when biodegradable and conventional plastic products are offered side-by-side with clear displays. In terms of the disposal of biodegradable plastic products, Taufik et al. (2020) found that, while compostable bio-

based packaging is perceived positively in terms of its environmental benefits, consumers are more likely to dispose of it incorrectly. This suggests that there may be unintended behavioural consequences when more biodegradable plastic products are introduced. It must be noted that recycling behaviour is not purely an individual action reflecting a person's attitude towards the environment (Van Birgelen et al., 2008), but that it is also determined by the available recycling infrastructure.

The context of solving real-world problems is one method to appreciate the interrelationships between the content areas of science, technology, engineering, and mathematics (STEM) that are inextricably linked. Most societies have STEM knowledge and the capacity to integrate those resources to find solutions for new problems as a fundamental capability (Hasanah et al., 2022); a society's collective ability to develop STEM knowledge affects its global standing. As a result, there has been a surge in interest in integrated STEM education (Hoeg and Bencze, 2017). One aspect of such recognition would be the requirement to train teachers who are versed in STEM disciplines and even engineering design. Furthermore, engineering content and methods are unfamiliar to teachers (Nadelson et al., 2013). As a result, there is a definite demand for STEM education teachers' training. Additionally, research indicates that students learn more effectively when involved in meaningful activities that result in authentic artefacts (Fortus et al., 2005). Awareness of the impact of plastics, both conventional and bioplastics, on the environment, must be brought to attention in time, mainly through education. In this case, the teacher - as a facilitator in the classroom - plays a vital role in appropriately conveying the message to preserve the environment (Kalimullina et al., 2021). To adequately conveyed the message, an attractive learning design with a STEM approach is needed for students.

Research Problem and Context

The CONNECT approach takes the form of a "scientific action". It includes a set of activities that integrate a real-life science problem into an existing topic, one of them being oriented on "*Biodegradable plastics - a solution to "white pollution"?*". The addressed problem gives students the motivation to learn science concepts. Moreover, the activity tries to stimulate students to discuss science with their families. During the science action activity, students apply scientific ideas in new contexts, having also the opportunity to involve a scientist or engineer to work with them. In the end, students are challenged to use their knowledge and skills, which provides an authentic evaluation of the activity. CONNECT targets secondary schools and teachers offering an inclusive and sustainable model to increase students' confidence towards using science, bringing them together with science professionals and engaging family members to improve their attitudes toward science careers, in this sense, installing the conviction that "science is for me".

The "Biodegradable plastics - a solution to "white pollution"?" science action activity is supported by a set of educational resources (CONNECT, 2022) that contribute to the completion of the mentioned scientific activity: *Teacher's guide*, *STEM Specialist guide*, *Student's sheets*, *Experiment sheet*, *Homework family sheet*.

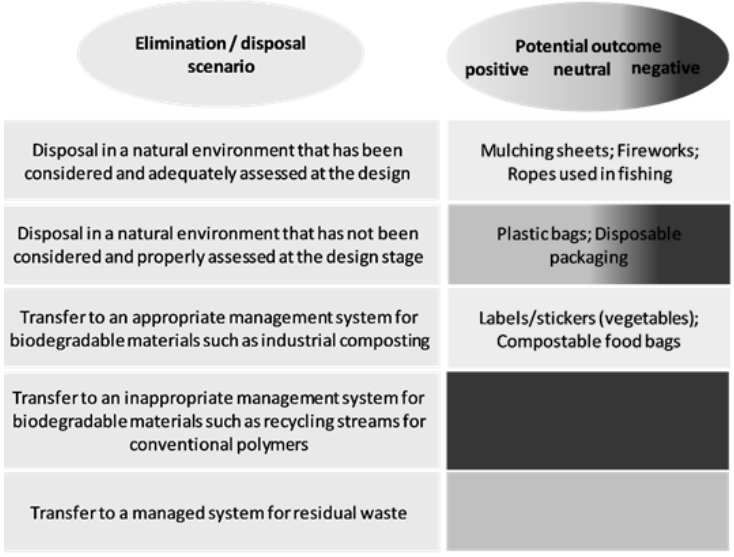
The Teacher's Guide document provides from the start a supportive background related to the following issues: "White pollution"; What are biodegradable plastics?; Can

biodegradable plastics solve the problem of 'plastic' accumulating in the environment?; What are the potential environmental risks associated with the use of biodegradable plastics?; What is the role of biodegradable plastics in reducing "white pollution"?; What are the opportunities and challenges of using biodegradable plastics? There is also included the integration of three additional activities (I CARE - "White pollution", I KNOW - Biodegradability of plastics in the environment, and DO - Awareness campaign) from the scientific action "Biodegradable plastics - a solution to solve "white pollution"?" related to existing lessons from the curriculum content. For each additional activity, learning objectives are specified, such as what students do and who can be involved (the teacher, the STEM specialist, and the family).

The *STEM Specialist guide* also provides supportive information related to the biodegradability of plastics in the environment and notes on the implementation of activities. It is important to note that while the material illustrates examples where biodegradable plastics can bring benefits as well as those where the benefits are less obvious, there is no universal solution. To obtain a net benefit from the use of biodegradable plastics as part of the circular economy, also considering the environmental risk perspective, the potential advantages of biodegradable plastics over conventional plastics need to be considered on a case-by-case, application-by-application basis. Potential benefits in terms of biodegradability are only likely to be realized if, at the end of its lifetime, the plastic object reaches a receiving environment suitable for biodegradation of the specific plastic material and its composition/formulation. The proposed disposal scenarios (Figure 1) are determined by the application associated with the plastic material, the waste management system, the regulations in place, the information or labelling to guide the user on appropriate disposal, and the end-user actions or behaviour concerning that information.

Figure 1

Alternative End-of-Life Disposal Scenarios for Biodegradable Plastics and the Potential Outcome over Conventional Plastics



Note: Adapted from (SAPEA, 2020)

The examples provided through the *STEM Specialist guide* consider some current applications of biodegradable plastics concerning several potential considerations in assessing in terms of the waste hierarchy and the potential environmental benefits or risks associated with the use of existing or new biodegradable plastics compared to conventional plastics.

The *Experiment sheet* ("Obtaining a biodegradable plastic from renewable sources") proposes to the students an experimental activity in which the family is also involved. One of the major challenges today is the development/design of cheap and sustainable biodegradable plastics from renewable sources. In this experiment the students will try to make a "bioplastic" that is both biodegradable and compostable; they must keep in mind that if biodegradable plastics are mixed with other conventional plastics for recycling, the recovered plastic is not recyclable because of the variation in properties and melting temperatures. The students are encouraged to involve a family member(s) to help in running and following up on the results of the experiment as well as completing an observation/monitoring sheet. Last but not least they can be creative and use their imagination but try to scientifically justify their chosen options.

Research Focus and Aim

Taking into consideration the fact that science actions represent new didactic approaches in Romanian science education, it is important to assess how such demarches are received by students. In this respect, the science action dedicated to plastics biodegradability (having its particular format, as designed in CONNECT project) represented an important opportunity to measure the students' feedback considering how confident they became with science or doing science projects in collaboration with others, how they perceived their family support, how much input made the teachers (in their perception - in terms of giving explanations and promoting discussions), and how important is the scientific knowledge and related skills for their lives and future careers. As Romanian secondary students are more and more non-interested in science - their lack of interest being mainly a result of how science is taught (Ciascai et al., 2014) -, such approaches can be widely introduced in lower and upper secondary education, having the aim to improve their performance in science and raise their interest in pursuing careers in science-related fields.

Research Methodology

General Background

The science action oriented on "*Biodegradable plastics - a solution to "white pollution"?*" has been proposed to be implemented in schools since the second semester of the 2021-2022 school year. The action was promoted to teachers in several workshops from October 2021 to January 2022 and enjoyed the interest of lower- and upper-secondary teachers from seven Romanian Counties. The implementation was carried out in a hybrid format, in schools and outside them, taking into account the pandemic situation recorded in that period. Both teachers and students were able to access the CONNECT platform and benefited from the support of researchers and specialists who assisted them and interacted when necessary.

Since the beginning of the implementation process, the promoters of science action expressed the desire to assess the impact of such an approach on students' interest related to science. In this sense, favourable feedback from students made the promoters consider an important impetus for extending the implementation of science action to more Romanian counties.

Sample

The sample was constituted of secondary students who participated in the implementation process of science action, at the schools (and related teachers) who expressed their availability for adopting that new format with the view to spreading scientific knowledge. In general, the entire group of students from a classroom was involved in the action activities, and their feedback was collected at the end of the action. The data was gathered during the second semester of the 2021-2022 school year. More than 500 students who participated in the implementation process of the science action filled in a specially designed questionnaire related to the student's interest in science. A total of 373 feedbacks have been kept (74.6%), the rest of the records being rejected to inconsistent or incomplete data. The gender distribution of the sample was sensible equal: 195 female students (52%) and 178 male students (48%).

Instrument and Procedures

The questionnaire designed for students' feedback analysis was developed by the CONNECT Project evaluation team, being recommended to all the partners who implemented the project-proposed science action units. For one question, a 5-point Likert scale was used (*Never - Rarely - Sometimes - Frequently - Very frequently*), and for the other 5 questions a different 5-point Likert scale was proposed (*Totally disagree - Disagree - Neither disagree nor agree - Agree - Totally Agree*).

Data Analysis

Data analysis was performed using Microsoft Excel, mainly by characterizing the students' answers and examining their distribution. The sets of data that were taken into consideration for the analysis were oriented on the students' confidence in science, their involvement in participating in collaborative science projects, doing science activities together with their families, feedback related to teachers' ability to emphasize the importance of science for their life and future, and in society.

Research Results

The science action oriented on "*Biodegradable plastics - a solution to "white pollution"?*" raised the interest of science teachers in seven Romanian counties where the action was proposed to be implemented. Consequently, the students expressed their enthusiasm, but a general picture of their feedback was known after the implementation process, being offered in Table 1.

Table 1

Students' Feedback Related to Their Interest in Science - Collected After the Implementation of the Biodegradable Plastics Science Action (n=373)

Items	Totally disagree	Disagree	Neither disagree nor agree	Agree	Totally Agree
			(%)		
Feeling confident talking about science	1	9	30	43	17
Feeling confident doing science projects with other people (with other colleagues)	1	6	22	50	21
Benefit from family support who consider that science is useful for personal future	2	5	29	42	22
Considering the teachers' explanations sufficiently related to the importance of science in their life and in society	2	4	10	54	30
Considering that scientific knowledge and related skills represent real help to get a job	2	5	27	46	20

Discussion

Even though it is difficult to appreciate the extent to which the students are confident when talking about science, since many variables can influence their answers (Han et al., 2021), it seems that nowadays they feel more confident considering the increased importance of STEM education in schools, but also in the society. In this respect, 60% of the questioned students *agreed* or *totally agreed* with being confident when talking about science. The implemented science action played an important role, making STEM education and its actual cutting-edge topics more accessible and open to all students, no matter what their backgrounds or abilities are. However, it remains an important percentage of students still need more didactic work from teachers in order to become confident when talking about science.

In addition, as collaboration represents an important part of nowadays didactics, teachers are asked to involve students in collaboration projects (Le et al. 2018), not only to develop their scientific skills but also to increase their capacities to work in a team, take proper decisions and develop communication skills. On the other hand, the student's confidence in working collaboratively on science projects depends on some crucial variables such as their experience gained in team-working, their level of interest in the scientific project, or their strengths/weaknesses. In our analysis, the science action raised the level of confidence concerning the participation and implication in projects that require collaboration. In this respect, 71% of the questioned students *agreed* or *totally agreed* with being confident when doing science projects in collaboration. On the other hand, it remains approximately 30% of questioned students still have problems when considering collaboration in groups, either due to a lack of experience or a lack of confidence in their abilities. However, working in groups remains an important key to understanding science and makes students more confident in collaborating on science

projects. In addition, students who expressed a strong interest in science projects are very motivated to work collaboratively and discuss with colleagues their ideas and opinions.

In general, family involvement has a positive impact on students in STEM education (Ing, 2014). In this sense, the involvement of families in students' STEM education can reinforce the importance of science for their present and future lives and careers, several ways being exploited by families to illustrate science as a vital area to be understood and learned, through: (a) encouraging exploration and experimentation scientific concepts at home, by performing hands-on activities; (b) attending - with the entire family - different scientific events in dedicated institutions (science museums, science centres, botanical gardens, zoological gardens, etc.); (c) supporting STEM learning in the classroom, by providing additional resources or volunteering help the implementation of science projects; (d) modelling STEM-related behaviours, by expressing an interest in STEM and encouraging students to embrace STEM careers. The implemented science action proved to have an important proportion of family implication (66% of the feedback is in the category *agree* or *totally agree*) on considering that science is useful for students' future. As the science action proposed a strong interaction with the student's family, it comes normal to discuss inside the family issues concerning the usefulness of science for the future career.

As a teacher, it is a crucial issue to offer students sufficient information and explanations in order to help them understand the importance of science in their life and in society. Students need arguments and pieces of evidence to understand the world around us with the laws of physics, chemistry, and biology that govern it. On the other hand, students must be aware that science is the basis of progress, by driving innovation and leading to the development of new technologies, offering also solutions to societal problems (Rull, 2014). The teacher's explanations and support must converge to make students understand that science is essential for a sustainable future. The proposed science action tries to convince students to think sustainably. Discussion on "white pollution" issues, biodegradable plastics, or potential environmental risks associated with the use of biodegradable plastics are found at the centre of the topics related to environmental protection. In this respect, it is commendable that the proposed science action is well-framed in the sustainability debates, 84% of students *agreed* or *totally agreed* on the sufficiency of teachers' explanations regarding the importance of science in their life and society. More, science knowledge and related skills can represent a significant advantage for getting a future job. Students with a powerful scientific background can be more attractive candidates and can make them assets in developing new products, processes, and technologies. The proposed science action demonstrated its importance in that direction - 73% of students *agreed* or *totally agreed* on the fact that scientific knowledge and related skills represent real help to get easier a job.

Of course, not just the teacher and school support remain important, by guiding and orienting students and setting up a positive and inclusive environment where they feel comfortable working together. As discussed, involving families in STEM education represent a crucial help for defining a supportive and engaging environment for their children, by encouraging them to discuss important scientific subjects, and - why not? - trying to offer decisions on important issues. In this way, it is clear that students appreciate how important is science for their lives and future, but also for solving real-life problems, by valorising the acquired scientific knowledge for their personal and social development (Drăghicescu et al. 2015).

Conclusions and Implications

As the presented action - proposed and implemented in the frame of the CONNECT project - offered to teachers and students an approach that was different from how teaching and learning science look in the traditional format, the students' feedback collected immediately after the action implementation proved to be importantly related to how such actions need more attention and should be included in general practice for bringing the students near science.

The research offers empirical results related to students' interest in science, expressing that such actions raise the students' confidence in science, their involvement in participating in collaborative science projects, or their readiness to perform science activities together with their families. Even though there are still some barriers that may prevent some students from feeling confident in discussing science, teachers need to continue to work with students with the view to extending the students' trust in science.

On the other hand, analysing the students' feedback related to teachers' ability to emphasize the importance of science for their life and future, it can be concluded clearly that just through understanding science, learning, and deepening scientific concepts, making connections between them and the environment, and trying to find a sense of life (from the scientific point of view), the students can be fully ready for their future careers, for innovating and expressing their creativity, for thinking critically and solving local or widespread problems, but also for using the technology effectively, considering that at the moment, there are plenty of available resources to learn about and engage with science, and many initiatives coming from schools and teachers to promote science and its wonderful world.

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The CONNECT project's goal is to create an inclusive, sustainable model that will facilitate the adoption of open schooling by a large number of secondary schools by implementing science-action gamification projects in the core curriculum.

Declaration of Interest

The authors declare no competing interest.

References

Ciascai, L., Haiduc Șuteu, L. D., & Felezeu, C. (2014). How science is taught in the secondary and high school levels in Romania? *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, *29*(1), 74-86. http://efdergi.hacettepe.edu.tr/yonetim/icerik/makaleler/102-published.pdf

CONNECT. (2023). *Inclusive open schooling through engaging and future-oriented science. Biodegradable plastics - a solution to "white pollution"?* https://connect-eu.exus.co.uk/ro/2022/02/22/bioplastic-en/

Dauvergne, P. (2018). Why is the global governance of plastic failing the oceans? *Global Environmental Change*, *51*, 22-31. https://doi.org/10.1016/j.gloenvcha.2018.05.002

Dilkes-Hoffman, L. S., Pratt, S., Laycock, B., Ashworth, P., & Lant, P. A. (2019a). Public attitudes towards plastics. *Resources, Conservation and Recycling*, *147*, 227-235. https://doi.org/10.1016/j.resconrec.2019.05.005

Dilkes-Hoffman, L. S., Ashworth, P., Laycock, B., Pratt, S., & Lant, P. (2019b). Public attitudes towards bioplastics - knowledge, perception and end-of-life management. *Resources, Conservation and Recycling*, *151*, 104479. https://doi.org/10.1016/j.resconrec.2019.104479

Drăghicescu, L. M., Cristea, S., Petrescu, A. M. A., Gorghiu, G., & Gorghiu, L. M. (2015). The Learning to Learn Competence - Guarantor of Personal Development. *Procedia Social and Behavioral Sciences*, *191*, 2487-2493. https://doi.org/10.1016/j.sbspro.2015.04.571

Fortus, D., Krajcik, J., Dershimer, R. C., Marx, W. R., & Mamlok-Naaman, R. (2005). Design-based science and real-world problem-solving. *International Journal of Science Education*, *27*(7), 855-879. https://doi.org/10.1080/09500690500038165

Gabriel, A., & Menrad, K. (2015). Market acceptance and consumers' willingness-to-pay for plants in biodegradable pots. *Acta Horticulturae*, *1099*, 297-305. https://doi.org/10.17660/ActaHortic.2015.1099.34

Guillet, J. E. (2002). Degradable Polymers. In G. Scott (Ed.), *Degradable polymers: Principles and applications* (2nd ed.), (pp. 413-448), Kluwer Academic Press.

Han, J., Kelley, T. & Knowles, J. G. (2021). Factors influencing student STEM learning: Self-Efficacy and outcome expectancy, 21st century skills, and career awareness. *Journal for STEM Education Research*, *4*, 117-137. https://doi.org/10.1007/s41979-021-00053-3

Hasanah, S. S., Riandi , Permanasari, A., & Kaniawati, I. (2022). STEM Training for lesson plan on bioplastic and environment: Does it affect the teachers? *Morrocan Journal of Chemistry*, *10*(3), 564-575. https://doi.org/10.48317/IMIST.PRSM/morjchem-v10i3.33144

Hoeg, D. G., & Bencze, J. L. (2017). Values underpinning STEM education in the USA: An analysis of the next generation science standards. *Science Education*, *101*(2), 278-301. https://doi.org/10.1002/sce.21260

Ing, M. (2014). Can parents influence children's mathematics achievement and persistence in STEM careers? *Journal of Career Development*, *41*(2), 87-103. https://doi.org/10.1177/0894845313481672

Kalimullina, O., Tarman, B., & Stepanova, I. (2021). Education in the context of digitalization and culture: Evolution of the teacher's role, pre-pandemic overview. *Journal of Ethnic and Cultural Studies*, *8*(1), 226-238. http://dx.doi.org/10.29333/ejecs/347

Klein, F., Emberger-Klein, A., Menrad, K., Moehring, W., & Blesin, J. M. (2019). Influencing factors for the purchase intention of consumers choosing bioplastic products in Germany. *Sustainable Production and Consumption*, *19*, 33-43. https://doi.org/10.1016/j.spc.2019.01.004

Le, H., Janssen, J., & Wubbels. T. (2018). Collaborative learning practices: teacher and student perceived obstacles to effective student collaboration, *Cambridge Journal of Education*, *48*(1), 103-122. https://doi.org/10.1080/0305764X.2016.1259389

Magnier, L., & Crié, D. (2015). Communicating packaging eco-friendliness: An exploration of consumers' perceptions of eco-designed packaging. *International Journal of Retail & Distribution Management*, *43*(4/5), 350-366. https://doi.org/10.1108/IJRDM-04-2014-0048

Nadelson, L. S., Callahan, J., Pyke, P., Hay, A., Dance, M., & Pfiester, J. (2013). Teacher STEM perception and preparation: Inquiry-based STEM professional development for elementary teachers. *Journal of Education Research*, *106*(2), 157-168. https://doi.org/10.1080/00220671.2012.667014

Neves, A. C., Moyne, M. M., Eyre, C., & Casey, B. P. (2020). Acceptability and societal impact of the introduction of bioplastics as novel environmentally friendly packaging materials in Ireland. *Clean Technologies*, *2*(1), 127-143. https://doi.org/10.3390/cleantechnol2010009

Notaro, S., Lovera, E., & Paletto, A. (2022). *Journal of Cleaner Production*, *330*, Article 129870. https://doi.org/10.1016/j.jclepro.2021.129870

PlasticsEurope (2018). *Plastics - the Facts 2018*, An analysis of European plastics production, demand and waste data. Brussels: PlasticsEurope AISBL. https://plasticseurope.org/wp-content/uploads/2021/10/2018-Plastics-the-facts.pdf

Rull V. (2014). The most important application of science: As scientists have to justify research funding with potential social benefits, they may well add education to the list. *EMBO Reports*, *15*(9), 919-922. https://doi.org/10.15252/embr.201438848

SAPEA, Science Advice for Policy by European Academies. (2020). Biodegradability of plastics in the open environment. SAPEA. https://www.sapea.info/wp-content/uploads/bop-report.pdf

Shen, M., Song, B., Zeng, G., Zhang, Y., Huang, W., Wen, X., & Tang, W. (2020). Are biodegradable plastics a promising solution to solve the global plastic pollution? *Environmental Pollution*, *263*, Part A, 114469. https://doi.org/10.1016/j.envpol.2020.11446

Taufik, D., Reinders, M. J., Molenveld, K., & Onwezen, M. C. (2020). The paradox between the environmental appeal of bio-based plastic packaging for consumers and their disposal behaviour. *Science of The Total Environment*, *705*, Article 135820. https://doi.org/10.1016/j.scitotenv.2019.135820

Van Birgelen, M., Semeijn, J., & Keicher, M. (2008). Packaging and proenvironmental consumption behavior: Investigating purchase and disposal decisions for beverages. *Environment and Behavior*, *41*(1), 125-146. https://doi.org/10.1177/0013916507311114

Yeh, C. -H., Luecke, F. -K., & Janssen, J. (2015). Bioplastics: Acceptable for the packaging of organic food? A policy analysis. *Journal of Agriculture Food Systems and Community Development*, *6*(1), 95-105. https://doi.org/10.5304/jafscd.2015.061.009

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