The Importance of Sharing Current Scientific Information with Biology Teachers in Weekly Newsletters

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Abstract

High-school teachers and students do not usually have access to scientific research advances because original research papers contain many highly specialized words that are specific to the discipline. Scientific newsletters (SNs) summarize current scientific research advances and trends. During the 2022–2023 school year, 21 SNs teaching biology content were written by a team of science-education and biology specialists working at the National Center for High-School Biology Teachers in Israel, according to the following criteria: (a) the SNs were based on primary research papers published in international well-known scientific journals such as *Nature, Cell or Science*; (b) the biological content was related, albeit not necessarily directly, to the Israeli high-school biology curriculum; (c) some of the SNs were related to biological events that occurred during the week in which the SN was distributed, such as World Diabetes Day. The SNs were written in Hebrew, translated to Arabic, and sent weekly via WhatsApp to 901 high-school biology teachers. After sending 10 SNs, an anonymous questionnaire was sent to the teachers to understand their use of the SNs and identify topics to which teachers would like us to relate in the next SNs. Forty-nine teachers answered the questionnaire, revealing that according to their open-ended answers, some of the teachers valued the importance of receiving SNs teaching biology topics as a way to enrich their own biological knowledge, and to engage their students with meaningful scientific research and with the real-world work of scientists. Further research is needed to analyze the impact of the SNs on teachers’ professional development.

Keywords

*scientific newsletter, high school, questionnaire*

INTRODUCTION

Scientific newsletters (SNs) teaching topics in biology serve as curated summaries of current scientific research and advances. They are typically written by experts in the field and provide context, explanations, and implications of the research findings. They provide students with updates on the latest discoveries, trends, and breakthroughs in biology, keeping them informed on the dynamic nature of the field. SNs condense complex scientific information into accessible formats, making it easier for teachers and students to understand and engage with the material, an ability that most teachers and students do not otherwise have (Schäfer, [2017](#HueD_Ref22)). They expose teachers and students to authentic and contemporary scientific information, providing them with real data collected from recent scientific studies (Schriebl et al., [2023](#HueD_Ref23)). Such exposure to scientific studies allows teachers and students to engage directly with scientific data and develop skills in data analysis, interpretation, and critical thinking. Moreover, working with authentic data may help students understand the scientific process, the complexities of research, and the limitations of data collection (Anderson et al., [2020](#HueD_Ref2)).

It is difficult for teachers and students to read original research papers, mainly because the information is often abstract, and the texts contain many technical terms and highly specialized words that are specific to the discipline (Ariely et al., [2019](#HueD_Ref3); Ariely & Yarden, [2018](#HueD_Ref4)). In addition, students (and some teachers) may have limited understanding of the structure of a scientific article and might therefore miss the meaning of the research paper (Yarden et al., [2015](#HueD_Ref28)). Accordingly, there are several advantages of writing SNs for teachers. First, biology is a rapidly evolving field, with new discoveries and research emerging on a regular basis (Cunningham et al., [2021](#HueD_Ref6)). By reading SNs, teachers and students can keep up to date on the latest scientific breakthroughs, cutting-edge technologies, and innovative research findings (DebBurman, [2002](#HueD_Ref8)). This helps them stay current and ensures that the information they are reading is accurate. Thus, SNs can serve as a bridge between the scientific community and the classroom. By receiving updates on scientific research and advances, educators and learners may understand the real-world applications of biology, connect textbook knowledge with current developments, and develop a deeper appreciation for the scientific process, thereby enhancing students’ scientific literacy skills (Anderson et al., [2020](#HueD_Ref2)).

Second, biology teachers can use the SN as a valuable resource to supplement their lesson plans. SNs can provide them with new laboratory techniques (De Jong et al., [2013](#HueD_Ref7)), and relevant examples that may help make their classes more engaging and effective (Ghavifekr & Rosdy, [2015](#HueD_Ref10)). Access to the latest scientific information may empower teachers to provide a well-rounded education to their students and can foster a deeper understanding of the subject.

Third, SNs may well serve as a source of inspiration and motivation for students (Krapp & Prenzel, [2011](#HueD_Ref14)), and for teachers’ scientific content knowledge (Diamond et al., [2014](#HueD_Ref9)). By regularly receiving scientific updates, students and teachers can explore fascinating topics, learn about breakthroughs in various biology disciplines, and understand how biology impacts and is relevant to their lives (Gilbert et al., [2011](#HueD_Ref11); Stuckey et al., [2013](#HueD_Ref25)). This exposure to current scientific knowledge can ignite curiosity and inspire students to pursue careers in biology or in related fields.

Fourth, the SNs may serve in future as a catalyst for inquiry-based learning, encouraging students to ask questions, explore scientific concepts, and analyze biological data. Thus, the SNs may encourage students to conduct authentic inquiry projects, having been inspired by scientists to use the components of the inquiry process (Jeanpierre et al., [2005](#HueD_Ref13)). The exposure to authentic and current biology information may foster critical thinking skills, nurture scientific curiosity, and deepen students’ understanding of the scientific process (Rodríguez-Becerra et al., [2020](#HueD_Ref18)). Moreover, by showcasing the relevance and impact of biology in various fields, such as medicine, environmental sciences, and biotechnology, the SN might inspire students to pursue further studies in biology or related disciplines, thereby fostering a future generation of scientists and innovators (Savelsbergh et al., [2016](#HueD_Ref21)).

Fifth, in an era of information overload, it is essential to promote scientific literacy among students, especially by attempting to reduce misinformation (Sharon & Baram-Tsabari, [2020](#HueD_Ref24)). SNs that are tailored to the high-school level can provide accessible and digestible summaries of complex scientific concepts from reliable principal sources. They can explain key discoveries in a language that is understandable to students, enabling them to grasp the significance of scientific research and its implications for society. This may help develop scientific literacy skills such as critical thinking, and encourage evidence-based reasoning (Majetic & Pellegrino, [2014](#HueD_Ref16), [2018](#HueD_Ref17)).

Today, messages to teachers and students are often sent via WhatsApp. This instant messaging application enables sharing multimedia messages quickly in closed groups (Rosenberg & Asterhan, [2018](#HueD_Ref19)), as opposed to email that is not an instant application and is not used in closed groups. The most important feature of this application is its accessibility anytime, anywhere (Tang & Hew, [2017](#HueD_Ref27)), much more accessible than email. Research on the impact of WhatsApp use on educational processes in high schools has found that learning via messages occurs unintentionally, and that the messages that are sent with images contribute to students’ learning (Cetinkaya, [2017](#HueD_Ref5)).

In this paper, we describe the process of writing and distributing SNs teaching biological topics to biology teachers, and the teachers’ responses to a questionnaire that enabled us to probe their use of these SNs.

METHODOLOGY

As a part of the activities of the National Center for High-School Biology Teachers in Israel, during the 2022–2023 school year, a team of science-education and biology specialists wrote 21 SNs teaching biological topics to biology teachers. In this section, the team describes the process of writing the SNs, their distribution and delivery process, and the teachers’ reflections on their use of the SNs.

Newsletter Creation

The process of writing the SN started with screening the latest scientific journals for articles from recent months that engage with biological issues that could be interesting and relevant to biology teachers and students. The following design principles were considered:

1. For each SN we used current articles, published in the last few months, in order to expose readers to the most recent biology innovations. Biology innovations might enable teachers to combine this knowledge while teaching, exposing their students to the most up-to-date biology innovations.
2. Each SN is based on a primary research paper that has been published in a well-known scientific journal such as *Nature, Cell or Science*, in order to enable readers to glimpse into the most cited scientific journals.
3. The biological content is related, albeit not necessarily directly, to high-school biology curriculum in Israel. Since the curriculum is expanded, teachers usually do not have time to teach additional topics and might use SNs that are content related to the curriculum to enrich their teaching.
4. Some of the SNs relate to biological events that occurred during the week of their distribution (for example: World Diabetes Day, World Cancer Day, etc.) to show the relevance of biology research to our everyday lives.
5. The content varies, with each SN teaching a different topic in biology. This variance enables each teacher to use some of the SNs according to the specified content of the curriculum that the teacher should teach.
6. In each SN, elements of the nature of science (NOS) are combined with the addressed biological topic to expose teachers and students to the way scientific research is done and at times to question the research validity.
7. The content is clear, concise, and easily understandable using plain language—while avoiding specialized words since it is more convenient to teachers when information is organized in a simple and logical manner, to enhance comprehension.
8. The SNs include at least one visual element to capture the readers’ attention and make them more engaging (Li & Xie, [2020](#HueD_Ref15)) and consist of relevant images, graphics, or infographics to support the content and enhance the overall design.
9. The SNs maintain a consistent design and format, including the relevant logos, to create a cohesive and professional appearance so that teachers can immediately transfer graphically designed high quality scientific information to their students.
10. Because the SN is sent by WhatsApp, it is no longer than 280 words—and usually less—so that it can be responsive and easily read on various screen sizes. WhatsApp messages should be short for ease in communication and convenience (Alazzawie, [2022](#HueD_Ref1)).
11. The SNs included a few questions for discussion, encouraging further engagement with the news, enabling the teacher to use the SN as a base for a whole lesson as well as using it as a trigger for further research by students. The SNs direct the readers to the original article as suggested reading.

The 21 SNs sent during the academic year of 2022–2023 were written in Hebrew by the first author and were scientifically and linguistically edited by the other authors of this article. Once the Hebrew version was ready, it was translated to Arabic by an experienced native Arabic-speaking teacher who is one of the authors, and this version was scientifically and linguistically edited by an expert Arabic-speaking biologist who is an author of this paper. The process was accompanied by a graphic artist specializing in biology using a template and adjusting it to each SN. An example of one newsletter that was translated into English is shown in Figure [1](#HueD_Fig1).

[COMP: Insert Figure [1](#HueD_Fig1) about here.]

**Figure 1.** An example of a “Biology Weekly” sent on January 15, 2023. The photograph was taken with permission f[rom Taboada (2022)](#HueD_Ref26), by Dr. Jesse Delia.

Distribution and Delivery Process

During September 2022, the National Center for High-School Biology Teachers in Israel sent an email message to the teachers on its mailing list informing them that the center would soon start sending a weekly biology newsletter. Teachers were invited to join a WhatsApp group that was opened specifically for these SNs, in which only admins can send messages. A total of 901 teachers from all parts of the country joined the group.

The SNs were sent every week during the academic year on a set day and time, excluding holidays. We sent 21 SNs from October 2022 until the end of March 2023. The newsletter distribution terminated at this time because from April on high-school biology teachers are busy mainly with preparations for the biology matriculation exam and do not have time to enrich their students with SNs teaching biology topics. The teachers were informed that the newsletter would return in October 2023. All the SNs, in both languages, are saved in the site of the National Center for High-School Biology Teachers in Israel.

Teacher Reflection Process

After sending 10 SNs, we sent the teachers an anonymous questionnaire via the WhatsApp group (Figure [2](#HueD_Fig2)) to understand whether and how they use these SNs, and to find out what topics they would like us to relate to in the next SNs. This was the aim of this questionnaire though direct use of the SNs is not a requirement for their newsworthiness.

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**Figure 2.** The questionnaire that was sent to the teachers.

FINDINGS

In this section, we describe teachers’ responses to the questionnaire distributed after sending 10 SNs, and give an example of a teacher’s use of an SN in her school.

Responses to the Questionnaire

Forty-nine teachers answered the questionnaire. Although this is a small percentage of the teachers who received the SN, we refer to these teachers as a pilot group because this is the first year that we sent this newsletter to teachers. The feedback was varied. Most of the teachers reported that the SNs are either very interesting or interesting (92%, Table [1](#HueD_Tab3)), yet only 15% used them every week and 60% used them sometimes (Table [2](#HueD_Tab4)). Thus, not all teachers used these SNs, even though they found them interesting.

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**Table 1.** Percentage of teachers (*N* = 49) referring to the interest of the SN.

**Table 2.** Percentage of teachers’ use of the SN (*N* = 49).

When the teachers were asked to explain whether the SNs are interesting, we received a few typical answers: “*The topics are diverse, and come from the forefront of research with proper, understandable and intriguing details”; “The newsletters relate to relevant topics being studied”; “They are up to date and interesting, and are connected to innovative fields of research”; “They are connected to the basis of the topics studied in class”; “New updates from science and medicine keep students informed and curious.”* We also received responses that criticized the topics that we chose to teach in the SN: “*I would like the newsletters to contain more data so that I can use them as an exercise for the matriculation exam.”*

When the teachers were asked whether they used the SNs to teach biology topics in class, we received a few answers that reflected intentional use of the newsletter: “*I have used the newsletters to prepare a quarter of an hour at the beginning of the lesson to teach the recent research”;* “*I show the newsletter on the screen and learn about the content of the article with the students”;* “*I let students learn and explore, and convey what they have learned to the class through a short presentation”;* “*I* *read the newsletter in class and discuss it with the help of the questions at the end of it.”*

Other teachers used the SN in a less intentional way: “*The knowledge I receive from the newsletters helps me explain things, or give examples in class. For example, I taught about cancer, and I mentioned the progress of science and the innovative ideas that are available to treat it which I learned from a newsletter”; “I use information from the newsletter in the summary of topics or as a means of presenting the future of research.”*

In a third type of use, teachers transferred the newsletter to their students with some or no reference to it: “*I just pass it on to the students so they can read it”; “I send it to the class WhatsApp and ask if there are questions regarding the newsletter in class.”* Finally, there were teachers who did not relate to the newsletter in class: *“There has not yet been a newsletter that overlaps with the curriculum, so I have not used them. When there will be, I’ll use it.”*

Teachers’ Use of the SN

M.A., a biology teacher in a high school in the south of Israel belonging to the Arabic sector, who translated the SNs to Arabic and is one of the authors, used one of the SNs to create a “Biology Weekly” corner in her school. The corner was created on a large board in a central place at the entrance to the school (Figure [3](#HueD_Fig5)). In addition, M.A. distributed an explanation about the corner and its location through teacher and student WhatsApp groups. She shared her intentions: “*To raise curiosity about the field of biology and in light of the importance of keeping abreast of this field, I prepared, together with 11th-grade biology students, a ‘Weekly Biology Newsletter’ corner. Our aim is to expose high-school biology students, as well as other students and teachers in our school who are interested in updating their biology knowledge, to up-to-date biology news every Sunday.”*

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**Figure 3.** Students and teachers at the “Biology Weekly” corner.

DISCUSSION

The aim of this study was to describe the process of writing SNs focused on biology content, and to look into the use of these SNs among teachers. An anonymous questionnaire was sent to the teachers to understand whether and how they use the SNs, and to find out what topics teachers would like us to relate to in the next SNs. The findings revealed that according to their open-ended answers, some of the teachers value the importance of receiving SNs teaching biology topics as a way of enriching their own biological knowledge, and of engaging their students in meaningful scientific research and the real-world work of scientists. As a result of this awareness, the SNs led many of the participating teachers to incorporate the latest research findings and breakthroughs into their teaching, creating a more vibrant and interactive learning environment. We should emphasize that even for teachers who did not incorporate the SNs in their classrooms, there is an enormous value to be informed and abreast of new developments in science.

Moreover, as the teachers acknowledged in the questionnaire, the SN serves as a professional development tool, empowering them with innovative research techniques and approaches. By exploring the real-world applications of biology innovations, teachers can foster a deeper understanding of the subject matter for themselves and to pass on to their students. Research has found that teachers’ advanced scientific knowledge may have an effect on students’ science-achievement outcomes (Diamond et al., [2014](#HueD_Ref9)). The teachers stated that they take this reliable information and integrate it into their lesson plans. This ensures that the content they deliver to students remains accurate, up-to-date, and aligned with the rapidly changing scientific landscape (Rushton & Reiss, [2019](#HueD_Ref20)).

While teachers mentioned the benefits of receiving the SN teaching biological topics, some of them mentioned problems, such as not having enough time to relate to it or it having no connection to the curriculum. For that reason, tailoring the content to different educational contexts and addressing the specific needs of teachers in various settings are important factors that we considered when planning the SN content. It is essential to establish ongoing feedback mechanisms to gather input from teachers, evaluate the impact of the SNs on classroom instruction, and make necessary improvements in the content and delivery process. We intend to deal with all these issues in the near future, before sending out more SNs. Nevertheless, we can conclude that these SNs play a pivotal role in bridging the gap between scientific advances and the classroom, in shaping biology education, and in educating more scientifically literate students.

Limitations

We highlighted the benefits of sending SNs teaching biology topics to teachers, but it is important to acknowledge certain limitations associated with this study. First, the study focused on a short-term implementation of the SNs and did not assess the long-term impact on teachers’ instructional practices. In addition, this study did not assess the students’ outcomes as a consequence of receiving these SNs, such as their influence on student achievement. Longitudinal research would provide a more comprehensive understanding of the sustained effects over time. We intend to continue researching the impact of the SN after sending all 21 of them on the teachers’ professional development.

Finally, the study includes the responses of a group of teachers who chose to answer the questionnaire. Since the response rate was low, the findings may be biased. It could be, for example, that only those teachers who made use of the SNs wished to answer the questionnaire. In subsequent extensive research, we intend to involve more teachers to receive a wider range of answers.

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