DISCOURSE COMMUNITY PROJECT: ENVIRONMENTAL TOXICOLOGY

Abstract

When told about "Environmental Toxicology", most individuals would respond that they know the two words separately, but not together. This unique and interesting program is frequently overlooked and shadowed the more commonly known majors, leading to prospective students not knowing that Environmental Toxicology is an option. With this in mind, the purpose of my paper is to share information about this major to those who may have not yet heard of it and are interested, as well as highlight the aspects of Environmental Toxicology that are most prevalent when it comes to research in the community. Two research articles from scientific journals, one undergraduate and one professional, were analyzed and compared in order to understand the difference in level of writing scientific papers and the requirements necessary to write effectively at each level. From this analysis, I can conclude that Environmental Toxicologists rely heavily on the information presented in the research article to communicate as scientists cite and refer to each other's articles when conducting their own research and writing their own articles. The organization and punctuality of the paper is apparent in scientific research articles from the collegiate level to the professional world. The ability to write professionally in a way that allows one to effectively communicate the results of their research to other scientists is an important and necessary skill for Environmental Toxicologists.

Introduction

When thinking of common majors in college, Environmental Toxicology is likely not one most would name first. Just by hearing the name, most would automatically associate the major to the study of pollution or global warming. While this is not wrong, Environmental Toxicology has a much broader range than people think. Environmental toxicologists gather information on various species in order to eliminate or reduce the presence of harmful substances and maintain a healthy living state. For example, one can conduct research on the effect of certain chemicals on the respiratory system or the effect of pesticides on different species of plant life. The major utilizes biology, chemistry, and physics while maintaining a strong stance on ethics. Environmental Toxicology is quite a flexible major which can help prepare students for careers in fields like medicine, forensics, and law. In this program dedicated to a versatile science major, a large portion is dedicated towards research, which covers an even broader range of topics. However, despite all the possible opportunities this major offers, the number of individuals who know of its existence is not so comparable. A small major with a small audience tends to have limited welcoming information. Therefore, the purpose for this paper is to provide insight as to how to build up writing skills, particularly for research purposes, to anyone interested in learning more about the hidden gem of a major known as Environmental Toxicology and the community within. As defined by linguist John Swales, a "discourse community" is a group of individuals who all share common goals or interests (220). For this paper, we will be exploring how the Environmental Toxicology discourse community communicates in terms of how the community interacts with one another while conducting and sharing their research. In particular, we will be analyzing four of Swales' six criteria for how to identify a discourse community, specifically the common goals, specific vocabulary, membership criteria, and mechanisms of intercommunication along with the genre of communication used within the community. By examining these aspects, we will establish the goals and requirements for joining the discourse community, as well as highlight a path for those interested in becoming a member. In doing so, individuals who are interested in a broad area of study and research can hopefully find a place within Environmental Toxicology.

Methods

In order to analyze the Environmental Toxicology discourse community, I will be utilizing a couple scholarly articles. As a science-related major, research occurs frequently and is highly encouraged for those in the field. By this means, an important genre within the community is the scientific research journals that are published and peer-reviewed by professional toxicologists. In order to analyze this genre, I will be using an article written by a group of toxicology researchers based in China titled "Curcumin suppresses the stemness of non-small cell lung cancer cells via promoting the nuclear-cytoplasm translocation of TAZ" (Zheng, Yuzhen, et al., 2021) from *Environmental Toxicology*, a professional and international scientific research journal. By performing a genre analysis on this article, the language and tone that is expected from environmental toxicologists will be revealed. As a secondary source, I will also be using an article written by UC Davis alumnus, Daniel Yim, titled "The Effects of Turbidity on the Foraging Behavior of Two Nearshore Crabs" (Yim 2017) from *Explorations: The UC Davis Undergraduate Research Journal.* With the inclusion of this research paper, we will further understand how undergraduates can get started in research at UC Davis as well as the level of writing required for a college-level scientific journal. Through examinations of both professional and collegiate scientific journals, the purpose is to compare and contrast the conventions used between the two levels of research in order to highlight methods and required skills needed to be developed while still in the major. Alongside these two scholarly articles, I will be connecting aspects of Environmental Toxicology and the community of undergraduates under the major to ideas from "The Concept of Discourse Community" by Linguist John Swales.

Results and Discussion

Common Public Goals

Before diving into what members of the Environmental Toxicology discourse community do or how they communicate, understanding why they follow this path and what their purpose for participating allows us to deduct if the community's goals align with our own. According to Swales' six criteria for identifying a discourse community, the first point mentioned is that the community must have some goals in mind that are shared and agreed on among the members (Swales 220). For the Environmental Toxicology discourse community, a defining goal is to better the conditions in which humans or animals live in by reducing their exposure to harmful sources. In the case of Yim, the main research goal was to discover the range of turbidity on nearshore crabs and conclude whether or not the effects were harmful enough to warrant concern. The main problem he was addressing was that according to multiple sources, "increased turbidity can result from both natural and anthropogenic activities" and in turn, these sudden changes in turbidity "can significantly affect predator-prey interactions and foraging behavior" (1). However, as mentioned by Yim, "relatively little is known regarding how turbidity affects their feeding or response to stimuli" (1). By both stating clearly the effects of turbidity on foraging behavior and the lack of information on the effects, Yim utilizes pathos as he highlights his concern for marine species possibly becoming negatively affected. This provides a clear purpose for his research as he conducts an experiment to gather information, as well as drawing on the emotions of his audience to find a solution. In a similar fashion, Zheng and his team of scientists addressed their main concern in their abstract. The goal of their study as stated was that they "aimed to investigate the effects of curcumin on the stemness of non‐small cell lung cancer (NSCLC) cells" as a response to how "lung cancer is the world's highest cancer incidence rate, and the most common and fatal cancer in China. Among them, 85% are non‐small cell lung cancer (NSCLC)" (abstract, introduction). The team of scientists based in China conducted their research in hopes to provide a solution to the overwhelming lung cancer rate in their home country. In providing statistics when discussing the cancer problem they are addressing, Zheng applies the use of logos and pathos to validate their research and perhaps incentivize other scientists to aid in their cause. By performing these experiments, environmental toxicologists aim to either find the cause of adverse effects

or become aware of the effects of certain substances with a purpose to use that information in order to eliminate the range of harm that could be done.

Membership Criteria

While the Environmental Toxicology discourse community is small and open to new members, there are requirements put in place as the goals of the community, such as improving living conditions, are not to be taken lightly. Another condition for a discourse community, as highlighted by Swales, is the need for a membership criteria that requires an individual to have or acquire certain qualifications or skills before they are allowed into the community (Swales 222). In the case of Environmental Toxicology, a membership criteria acts as a way to allow members to determine if the career is truly right for their interests in the future. Firstly, Environmental Toxicology as a major, especially one intended for undergraduates, the criteria for being selected into the major heavily coincide with the selection process into UC Davis in general. However, the terms of staying with the major and graduating with the major is outlined by the major requirements, including completing the MAT17 (mathematics) series which has an emphasis on putting mathematical concepts in the context of biology, the CHE2 (general chemistry) and CHE118 (organic chemistry) series, the BIS2 (biology) series, the PHY7 (physics) series, as well as a selection of upper division classes that emphasize a certain field in Environmental Toxicology. As students advance, the requirements function to select for individuals who are more serious about research in order to ensure that the results of the research are high quality. This raised requirement expectation can include a certain minimum GPA, completed course prerequisites, and connections or recommendations from accredited senior student researchers or professors.

Specific Lexis or Vocabulary

Knowing particular terms or words that can be commonly found within means of communication in the Environmental Toxicology discourse community is important when it comes to understanding their purpose. Continuing on to another requirement from Swales' six criteria for a discourse community, the existence of unique vocabulary terms is needed for members to communicate within the community (Swales 220). This allows for the community to communicate in a manner that is both quicker and more relatable, forming a connection between members that individuals outside the community might not be able to understand at first hearing. In the Environmental Toxicology, much of this specific vocabulary, or "lexis", is drawn from terms also commonly used in other sciences such as biology, chemistry, and physics. This includes laboratory equipment, for example in the case of Yim's research on nearshore crabs, he often references his usage of "Y-maze" which is a behavioral test for animals to measuring their ability to explore unfamiliar environments where the animal would choose between a new path and a familiar path (visually very similar to the letter Y hence the naming). The Y-maze is a commonly used test in environmental toxicology research involving animals, as it is an effective method in measuring how a species reacts or responds to a certain substance. Depending on the results, the range in which an animal's behavior changes can be a determining factor in how much a material or event can affect a species.

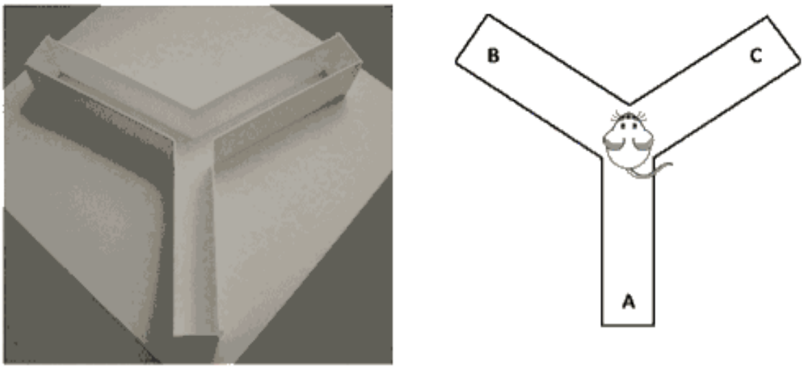

Figure 1. Y-maze. The Y-maze test is a behavioral test in which the animal being observed is placed in the center then is free to move. This test often results in one "arm" or path of the Y being less travelled to, and as such the Y-maze is a method used to measure an animal's willingness to explore new and unfamiliar environments.

Aside from equipment, another instance of specific vocabulary commonly found in genres of Environmental Toxicology would be the usage of the Latin or scientific name of a species rather than the commonly known name. For Yim, as he was conducting research on nearshore crabs, he repeatedly referred to the two species of crabs commonly known as the Striped Shore Crab and the Northern Kelp Crab as "*Pachygrapsus crassipes*" and "*Pugettia producta*" respectively, as well as the names of the food that was given, "Ulva lactuca" or sea lettuce and "Tegula funebralis" or Black Turban Snail.

Also seen in scientific articles written by toxicologists would be abbreviations of frequently used statistical tests, like the Analysis of Variance test commonly referred to as ANOVA, which Yim used to test how much the variation in the data collected was resulted from stimulus chosen by crab, level of turbidity, and the species of the crab. Much like this example of ANOVA, statistical tests are often shortened in order to more quickly be referred to. This particular lexis allows for fast and efficient communication between members of the discourse community, as with this abbreviation, researchers understand the test that was performed and how the test being conducted relates and strengthens the validity of the results.

Factors	Num dF, den dF	SS	F-value	p-value
Species	6, 55	2707.44	5.2966	**0.0253**
Turbidity	6, 55	623.49	1.2197	0.2744
Stimulus	6, 55	5480.30	10.7211	**0.0019**
Species x Turbidity	6, 55	1017.80	1.9911	0.1641
Stimulus x Turbidity	6, 55	1562.41	4.938	**0.0114**
Species x Stimulus	6, 55	10.37	0.0203	0.8873
Species x Stimulus x Turbidity	6, 55	855.64	1.6739	0.2013

Figure 2. ANOVA test. This is the analysis of variance test, also known as the ANOVA test that Yim conducted for his research on the effects of turbidity on nearshore crabs. In this test, he determined if and by how much the variation in decision time that the crabs made in the Y-maze test was based on the factors, then organized those results into a statistical data table.

Overall, lexis within the Environmental Toxicology discourse community is important because this allows for members to communicate efficiently with abbreviated vocabularies and for there to be a common language in the research space, usually laboratory. To extend and connect to the membership criteria, the specialized vocabulary within the community can be used as a way to ensure members understand the information present in the results or the steps being performed in the test, as if knowing the lexis unique to the community is a method for the community to see that an individual meets the requirements to be able to smoothly work in a research environment. Parallel to how someone outside the community would find it difficult to maneuver around the laboratory or the community in general without understanding the commonly used phrases, an individual who is knowledgeable in the lexis will be able to adeptly communicate, participate, and fit in alongside fellow members.

Participatory Mechanisms

Communication among members is a method of actively participating in the discourse community, and through this cycle of communication, the community is able to be self-sufficient in improving itself. According to Swales, a discourse community must have a method of encouraging member participation as a means of gaining information and providing feedback (Swales 221). In the Environmental Toxicology discourse community, a very reliable method of communication for research and information lies with the scientific research journals. With these journals, not only do scientists record and share their findings of their research with the general toxicology researching community, but in order to have an article published, the writing must endure a strict review process given by fellow researchers of that field. This peer review by another professional scientist will ensure that, should the article and results from the research be published and shared, the information and methods of conducting the experiment are reliable and accurately described to limit any chances of miscommunication or misinformation. Once the particular article is approved and published, other scientists can then use those findings as a credible source to either build on for their own research or construct a counter argument experiment if they have opposing views. This cycle of making sure information in research articles is correctly being shared by the peer review process and using credible articles to advance future research is how members of the Environmental Toxicology discourse community participate and give valuable input.

Genre Analysis

As important as communication is in a discourse community, the method in which environmental toxicologists, who are very widespread and even international, can actively share information with other members is necessary. A reliable platform for communication among its members, a genre, is also one of the requirements of a discourse community as given by Swales. For Environmental Toxicology, and really any sort of discourse community that builds knowledge through research, a fundamental method of communication is the scientific journals that have articles submitted and reviewed by professionals in the field. As researchers hoping to isolate harmful sources to the environment and maintain healthy and safe living conditions for all forms of life, environmental toxicologists rely heavily on the accurate and clear conclusions drawn by fellow researchers. Rather than conducting all research from scratch, environmental toxicologists can pull data and information from these scientific journals and in a sense “continue from there”. These scientific journals have summaries, evidence, conclusions, and references compiled in specifically organized and credible articles which other researchers can then easily locate and utilize. Given the importance of scientific journals to researchers, the organization and professionalism present in the articles meet rigorous community standards in order to achieve credibility.

Research articles prioritize organization and clear deliverance of results rather than opinions. To achieve this purpose most efficiently, many scientific articles follow a common general format consisting of subsections in order of abstract, introduction, methods, results, discussion, and conclusion with other sourced information and references usually placed at the end. This formatting is consistent in both the undergraduate and the professional article, and can be reasonably concluded that this method of organization for scientific writing is not only important as a convention in the genre, but also is a skill that can be practiced even from the undergraduate level as it is still applicable in the professional world. That being said, there is still a difference between the way the professional article presents their research and the undergraduate article. While both articles utilize subheadings, the titles chosen for the professional article are more straight to the point and formal compared to those in the undergraduate article. In the case of the article from the *Environmental Toxicology* scientific journal, the subheadings can be compared more to labels rather than titles, for example, "3.5 Curcumin attenuates the stemness of NSCLC cells dependent on TAZ" is one of the subsections from their results. When compared with a subheading from Yim's undergraduate paper, "Changes in Response Times", the difference between the two lies in how the professional subheading is very detailed and straight to the point, essentially like a topic sentence while the undergraduate subheading sounds more like an overview or brief summary. In this comparison, along with knowledge of how college level writing is like practice for developing the skills required of the professional world, we can see that the collegiate paper still has aspects like the subheadings with the purpose of attracting readers' attention. Since professional scientific journals have their purposes to present reliable results, it can be inferred through this contrast that scientists are more likely to organize and phrase their articles in a way that is concise and blunt with information as compared to undergraduate papers that mainly have a goal to present results.

Aside from organization but in connection to how researchers must find effective ways in delivering their results, another important aspect of scientific research papers is language that the author uses when writing. As a form of communication, specifically a means of sharing credible information, research articles typically use sophisticated language. In *Environmental Toxicology*, the word choice of the scientists is advanced with vocabulary such as "attenuates" or "ubiquitination" that most individuals outside the discourse community would have to search up to understand. The professional article also has a lack of explanation for specific scientific terms, for example "proteasome (MG132)" and "autophagy lysosome (Lysc05)". On the other hand, with the undergraduate research journal, the vocabulary while still advanced is not as sophisticated as a professional article. Particularly in *The Effect of Turbidity on the Foraging Behavior of Two Nearshore Crabs*, the word choice of the author includes academic language that is expected of a college student and the scientific terms used were to describe the scientific names of the species in the experiment, in which the common names were also given. For instance, Yim introduces the two species of crabs he used to conduct his research, "the shore crab Pachygrapsus crassipes" and "the Kelp crab (Pugettia producta)" (2). When in comparison to the article from *Environmental Toxicology*, the language present in the undergraduate article is more commonly known to the general public and terms that might be unfamiliar have an explanation provided. This advanced use of word choice in professional articles might be due to how professional research articles have an intended audience of other professional scientists, most likely those connected with the same or similar field of research, while audiences of undergraduate research articles are most likely other undergraduates and possibly anyone interested in hearing what research is being done by students of that college. Therefore, the scientists behind the professional articles might not include background information as it is expected that those reading already understand the content, and undergraduates most likely provide explanations in order to ensure the presentation of their research is clear to their general audience. Ultimately, whether it be undergraduate or professional, the goal of research articles is to share information gathered from their experiment, and in order to achieve this, authors use the ideal organization format and proper language appropriate for the intended audience.

Conclusion

With Environmental Toxicology being a broad major that draws from all different aspects of science, an overarching goal of the community is to ultimately provide an improved environment for living by isolating and reducing the risk factors. Those in the researching field of Environmental Toxicology tend to have specific vocabulary to discuss laboratory equipment, species of particular studying interest, and common statistical tests. For any individual who is interested in joining the Environmental Toxicology discourse community, the major is always an option and tends to overlap with the four-year plans of other various science majors already, which is a bonus for those who are concerned about an influx of new required classes while switching. For individuals who are looking to conduct research in the field of Environmental Toxicology, the requirements are a bit steeper with background in the various sciences and math being key for recruiters. Overall, the Environmental Toxicology discourse community is one that values the research efforts of fellow members, as a fundamental method of communication is the scientific journals that are reviewed and published by credible researchers in the field. With the common goal of improving living conditions in mind, the organization and language in articles is very serious and factual as the authors strictly discuss data and conclusions drawn from their research in order to provide accurate and correct information to other researchers. Overall, Environmental Toxicology is a major that caters well to individuals interested in conducting research to improve the lives around them, and the more individuals to aid in this cause, the better.

Works Cited

Swales, John. “The Concept of Discourse Community.” *Genre analysis: English in Academic and Research Settings*. Boston: Cambridge UP, 1990

Yim, Daniel. “The Effect of Turbidity on the Foraging Behavior of Two Nearshore Crabs.” *Explorations: The UC Davis Undergraduate Research Journal*, vol. 19, 2017, doi:http://Explorations.UCDavis.edu.

Zheng, Yuzhen, et al. “Curcumin Suppresses the Stemness of Non‐Small Cell Lung Cancer Cells via Promoting the Nuclear‐Cytoplasm Translocation of TAZ.” *Environmental Toxicology*, vol. 36, no. 6, 2021, pp. 1135–1142., doi:10.1002/tox.23112.