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Absence of Media Literacy in Green Energy: A Preliminary Study of Innovative Pedagogy for Interdisciplinary Professional Training on Science News

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Abstract: We carried out a preliminary study of innovative pedagogy for the solution of media literacy in public science by examining how the green-energy expertise must be effectively decoded by a competent journalist. Through formal/informal literature review and semiotic theory, a close insight is explored into the importance of an innovative pedagogy to professional training on science news for interdisciplinary talents at present. Focusing on green energy, this study emphasizes factors in the communication effectiveness of science news are agenda-setting and message design. These two factors support a specific recommendation to develop the core of enhancement of the training courses and converge the science and communication knowledge effectively in producing news. The outcome of this study is expected to solve the shortage of media discourse on the acquisition of green-energy-related knowledge. By this, the article emphasizes the interdisciplinary talents of journalism with social influence on public attitude towards green and further encourages social practice for environmental protection.

Keywords: Interdisciplinary professional, Innovative pedagogy, Agenda-setting discourse, Media literacy, Popular science

1. Introduction: Prompting Green Energy as Global Goal

'Green energy' has been the highlight of renewable energy. Among the sustainable development goals proposed by the UN in 2022, Goal 7 indicates the urgency in finding the best solution to achieve "clean and affordable energy" by 2030 (UNITED NATIONS, 2022). In particular, the world has undergone COVID-19 until now, which deters the predicted progress of the 2030 Agenda for sustainable development. For this situation, the UN elaborates on the danger of lacking energy sources and supplies in the near future, furthermore pushing it to be a public issue as an approaching crisis to human survival. In response to the UN's 2030 Agenda, social sectors echo and indicate that various dimensions of society are taken as crucial links threatened by collateral effects at any time, including food and nutrition, health, education, the environment, and peace and security.

In the midst of what is mentioned above, science has often publicized its concern and advancement in developing green energy so it has been highly esteemed by both government and private enterprises. For an instance, based on awareness of the urgency of global climate governance and ecological civilization construction, China has actively participated in the UN climate agendas by attending various international forums and co-promoted advanced green energy technologies, disseminating green development concepts. Since China's 19th National Congress Report in 2017 clearly stated its commitment, the government has made its position for playing a leading role in international cooperation on climate change and becoming an important participant in the construction of global ecological civilization and contributors (Zhao, 2017). This reveals China's determination to develop green energy and its commitment to leading more countries with 'One Belt, One Road'. The regions are encouraged to participate in promoting global energy and green sustainable development to provide a new model and new mechanism. Responses such as these are presented in the G7's latest annual report, which emphasizes the roles of international and regional institutes as well as individual roles of experts and academia's contribution to the current outcomes (UNITED NATIONS, 2022).

A New York Times Op-Ed columnist, Thomas Friedman claimed in his earlier work, 'Hot, Flat and Crowded' that green energy involves the challenge of a sustainable way of life and presents an opportunity for the world not only to rebuild its economy but to lead the world in radically innovating toward cleaner energy (Friedman, 2008). He calls for a green energy revolution which is the only way for human beings to solve the various energy crises. Friedman's proclamation also signifies this and coming century, human beings need to prepare a newly reformed collective attitude to co-exist with nature. To alleviate the climate change caused by global warming, the international community is expected to commit to reducing the amount of energy required and CO₂ emissions

as well as developing relevant technologies to improve energy efficiency. However, it has long been seen as a problem waiting for scientists or advanced technology to solve. Professional perspectives on green energy mostly have been held within official web pages. However, the related knowledge does not seem as general as the public lifestyle.

Adapting to the need of the times, green energy now has been closely linked to environmental protection, social practice, and civic action. Among them, the mass media must act as a crucial mediator in conveying green energy public knowledge effectively. However, the mainstream media is now facing challenges in the transformation of the media ecology. Since the emergence of digital new media, it has lost its previously dominant position in leading public issues to acquire scientific knowledge (Zhao et al., 2020). The conventional mainstream media, including TV and the press, has relatively not well functioned in building a knowledge society for popular science news within the established news framework. At present, most news about green energy focuses on the effect of energy regeneration technology as a result. Moreover, the reports often focus on the effect on the overall social economy after the implementation of green energy. However, to popularize scientific knowledge and cultivate civic society to apply science into social practice, Scholars believe that the part of the “scientific production process” can be the focus of science news for green energy, because the production of science and technology is an important indicator of the scientific industry through science news (Bucchi and Mazzolini, 2003).

In this article, it is assumed that the message readability deepens media literacy regarding green energy for the public to further encourage social practice from science news on green energy. Based on the situation that news talents for green energy are relatively less trained, we persist that the possibility of interdisciplinary training of future students majoring in media communication as an imperative solution for contemporary higher education must be implemented in college education. Combining both reasons, the front of media discourse transformation training is explored for journalists, that is, contemporary journalists need to integrate their journalism skills into public green energy knowledge with interdisciplinary thinking under the new media ecology.

2. Methodology and Theoretical perspectives

The qualitative data generated from the analysis of formal/informal documentation as well as digital-field surveys are found in critical media to be incorporating technology innovation. The scientific knowledge of green energy has been not effectively generalized in public. Thus, this study adopts the concepts of media literacy, agenda-setting theory, and discourse analysis. The theoretical perspective aims to conceptualize what can be argued about if contemporary media education is insufficient.

2.1. Media literacy

Media literacy is a new term referring to an extensive conceptualization of literacy. Literacy becomes even more complicated and crucial at present since new forms of media have been developed, and information become fragmented. In previous years, media literacy was highlighted as the ability of audiences/readers/receivers with certain levels of exposure to media to analyze, create, and reflect messages for taking action. Further, the ability is expected to generate social influence, and then make a difference in the world (Share 2015). Nevertheless, Potter (2010) indicates that with media becoming a vital part of people’s life, media literacy is deemed essential competency, intending to promote awareness of media influence and create an active stance towards both consuming and creating media. Based on the perspectives above, media literacy in popular science relies on journalists who mediate scientific expertise and the public. Therefore, the essence of media literacy involves an interdisciplinary domain.

2.2. Agenda setting theory

Fragmentized information is a significant feature of the contemporary media communication age and agenda setting is of vital importance. It relates to the media’s capability of shaping public opinion by the decision-making on what issues are given the most attention. According to McCombs and Shaw (2017), the theory particularly emphasizes that the media function of framing of previously set media discourse focuses on media representation. The audience would perceive them as the most important news and information given to them. In addition, media framing is a process of selective control in the newsroom. In particular and in principle, news content is shaped professionally. When audiences adopt the frames as their social reference, they have a similar perception of the world. The social reality is then constructed. To sum up, agenda setting deals with how people attach importance to certain news, and how they understand social reality from different angles.

2.3. Discourse analysis

Discourse analysis is used to examine and understand discourses concerning social interactions, and to analyze language use in social contexts. It focuses on the social aspects of communication and the ways people use language to achieve specific effects. Conducting discourse analysis means examining how language functions and how meaning is created in different social contexts

(Wortham et al., 2017). Media discourse refers to a media convention that manipulates multi techniques to bring social meaning to the public.

The key role of interdisciplinary application is represented by a future science journalist in representing mass media and disseminating public science. Therefore, this study explores the relationship between popular science, media literacy, and civic society, and the issue of how it must be incorporated to develop public knowledge on green energy. Science is not only a body of knowledge but also a way of knowing. One important underpinning for learning science is the public's understanding of the nature and structure of scientific knowledge and the process by which it is developed. For the vision of higher education's responsibility of interdisciplinary talents cultivation, the theoretical perspective used in this study is targeted at seeking green energy news reporting enhancement with media literacy and communication skills.

3. Material: Literature on Environmental, Governmental, and the Social

The urgent green-energy issue has evolved into a global one resulting in the US's condemnation of China for its lack of physical attendance during COP 26 in Glasgow in October (Lin, 2022). China's attitude toward green energy can be directed toward its exceeding carbon emissions and rapid growth in the world. Experts call stridently that if China's carbon emissions are not greatly reduced, the global effort to combat climate change will not succeed (Brown, 2021). De facto, China has pledged to try to keep carbon emissions capped by 2030 and to achieve carbon neutrality by 2060. This aim has also been incorporated in the 14th Five-Year Plan to elaborately conduct during 2020–2021 for National Economic and Social Vision Development and 2035 of the People's Republic of China (Technology Industry Information, 2022). The framework specifically indicates enhancing energy supply chain security and stabilizing the city in the policy guidelines of 'the 14th Five-Year Modern Energy System Plan' issued on January 29, 2022. It is expected to achieve 39% of energy power generation by non-fossil fuels by 2025 by increasing the supply of clean energy such as wind, light, water, and nuclear energy and accelerating the implementation of renewable energy substitution actions.

In addition to establishing policy aspects, the Chinese government has always attached high importance to the popularization of the work of science. In 2016, China's President Xi made an important statement during the Meeting of the Academicians of the Chinese Academy of Sciences (CAS) and the Meeting of the Academicians of the Chinese Academy of Engineering (CAE), emphasizing that scientific innovation and popularization are the two wings to achieve innovation development. Without the general improvement of people's literacy in science, it is difficult to rapidly transform technological outcomes (Xi, 2017). An academic of the Chinese Academy of Sciences, Wu Weihua also proposed that "Innovation, dedication, and science popularization are all essential" (Wu, 2018). Yet, why do we need to care about science? Professor Fu from the Institute of Science and Society of Yangming University in Taiwan said, "Technology is too important to be left to scientists only" (Huang, 2013). This reveals that the importance of technology in today's society is no longer limited to scientists because it becomes inseparable from the relationship between people and things brought about by the development of science and technology.

Access to new knowledge or technological inventions in science for ordinary people to acquire is usually through two ways. One is to gain new information through social interaction of interpersonal communication, and the other is to learn it via mass media. In recent years, in terms of popular science, the Chinese government has strengthened its communication through new media. Among them, China Science Popularization Network, Science Museums of China, and China Science Communication are the main new media platforms for popular science. These platforms are to provide comprehensive science news and technological issues. China Science Popularization Network and China Science Communication show science knowledge close to popular media. Science Museums of China represent that scientific knowledge is based on scientific research. However, the three have not had a special report on green energy technology. In the case of Taiwan, most of the green energy knowledge of ordinary people comes from the media news reporting on the risk of energy shortage. Such news reports are not conducive to deepening the public's understanding of green energy science and its practice.

As for the relevant research on green energy technology, Taiwan set up a topic of "Communication and Education Program for Citizen Science and Technology Literacy", bringing outstanding scholars together from various fields to investigate science news and civic attitudes toward scientific knowledge. The study showed that the application of green energy technology had not been effectively explained in the popular mass media, and the scientific and technological messages invested by the government lacked readable and acceptable encoding and caused ineffectiveness in proceeding social communication (Sadler et al., 2007). In addition, in the program, several scholars indicated that the Taiwanese media could not grasp the core of the problem for science news, and most of the relevant agenda settings were affected by the stereotyped news framework. Scholars also found, based on news framing, news media organizations tended to direct contents of science news to convey risks, warnings, and intimidation. The message that scholars proposed had less contribution to enhancing public knowledge of green energy.

Comparatively, research on science news from the globe has a more extensive and qualitative discussion. Ziman (1976) classified intellectual scientific knowledge into different levels related to the social. In particular, it must be emphasized in the

segment “Scientific Production Process”, because common knowledge of green science and green technological production process is the crucial indicator of public understanding through science news (Dimopoulos and Koulaidis, 2003). Scholars have suggested that science journalists may ‘walk into’ the laboratory of scientists to understand the in-progress scientific theories or ideas and assist scientists in further applying the theories to product development related to daily life. In doing so, they can effectively expand the scope of green scientific impact on society as a whole by introducing the scientific production process.

4. Results

4.1. Science news professionalization in communication model and message dealing

4.1.1 Communication model

Figure 1 shows the conceptualized basic communication mode. The Communicator conveys the message to the receiver via the channel, which then generates the effect (Weng 1993). The Communicator model shown in Figure 1 shows the Communicator effect emphasized by conventional communication research whose focus is put on the audience. The model also includes the Communicator channel, which is usually demonstrated with a rating survey. The famous British communication scholar, Stuart Hall, developed this conventional mode into the Encode/Decode communication mode in Figure 2 adding an ‘encoding process’ in between to emphasize the importance of the end of message production (Gregory and Miller, 2000).

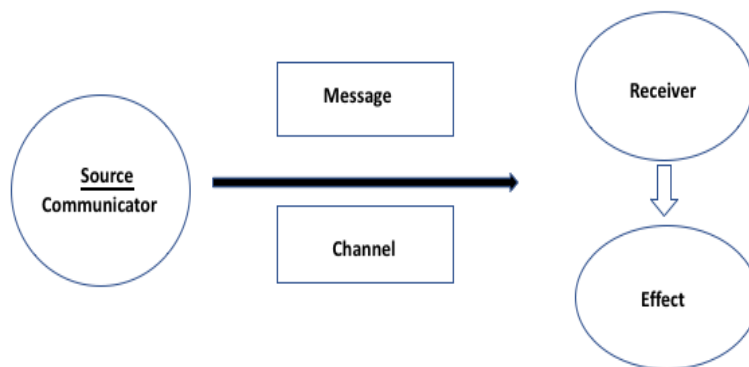


Fig. 1. Communication mode.

4.1.2 Message dealing

As shown in Figure 2, the Communicator needs to produce the Message combined with a series of related codes and transmit it to the Receiver through a Channel. The key process is Encoding. Therefore, in Hall’s concept, the Communicator is equal to the encoder. For communication, the encoder must consider communication skills, which refer to speaking, writing, and relative knowledge. The Communicator chooses the Source, arranges to produce the Message by organizing language, texts, sound, images, and other symbols altogether, and then represents hypertext content.

Hall believes that any communication mode is not naturally generated, and it must be reconstructed by the Communicator before the Message is sent. The reconstruction of the Message is interpretative, and social, and must be influenced by several factors, including perceptible factors such as producing frame, broadcasting methods, and networks. In addition, there are still hidden factors such as the communicator’s skills, professional ethics, professional concepts, knowledge structure, etc. (Weng, 1993). In particular, science news is usually involving intricate and obscure scientific knowledge, the communicator’s interdisciplinary profession is thereby highlighted to affect the message’s encoding process and its communication effect upon the communication mode.

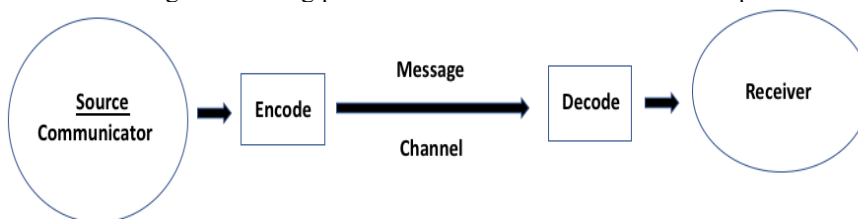


Fig. 2. Encode/Decode Communication mode.

Today, scientific knowledge has a far-reaching impact on society. Both the media and scientists are equally important in the dissemination of knowledge, yet scientific and technological news talents are insufficient. On both sides of interdisciplinary expertise, scientific experts lack skills in how to express their knowledge concerning ordinary people’s everyday life. Therefore, this study reinforces the role of media experts in the dissemination of public science, particularly green energy. Based on educational responsibilities, it is considered how students majoring in media communication cultivate themselves as interdisciplinary professionals in science news.

Furthermore, this study focuses on media reporting related to the tendency of green energy, delineating the scope of the “scientific production process” in media information design. By doing it, future science journalists become competent in disseminating scientific knowledge and further enhance its social influence. If science journalists can ‘unpack’ the production process step-by-step and the principles of green energy technology through science news readability, the enhanced media literacy on green energy deepens the public’s awareness and willingness to social practice.

4.2. *Necessity and practicality of innovative training pedagogy*

4.2.1 Points of science message

Based on Hall’s theory mentioning the reconstruction of the message, ‘the perspective’ of media production apparently serves an important role in the Communicator’s complex reference framework. Therefore, it is insufficient for disseminating green energy as public science merely depends on the journalistic specialty. Interdisciplinary professional training will be the basis of green-energy-technology news.

Science can be divided into two major dimensions: society and intellectual scientific knowledge such as research and development technology. Intellectual scientific knowledge includes scientific processes and scientific effects. When green energy news represents the material aspect of science and technology, it must reflect the principle and the technological production process of green energy with a message close to people’s daily life. The idea is to promote public awareness of green energy and encourage the public to adopt environmental actions. For this purpose, agenda-setting is a useful framework to place the scientific production process and the scope of technological influence under the social dimension shown in Figure 3. Embedding Hall’s conventional communication mode in the input and output of science news, the encoding/decoding process needs to become the core of the future cultivation of science news talents. In such a concept, science journalists need to possess the capability to express their interdisciplinary expertise through the layer of media, which plays a key role in public science.

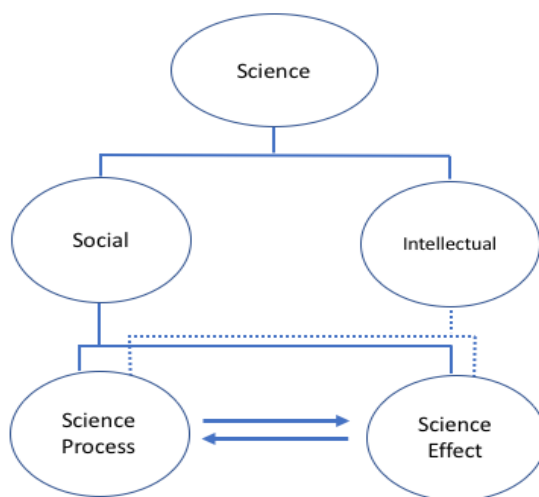


Fig. 3. Points of science message.

Furthermore, as shown in Figure 4, science issues are originally conveyed in science language. However, when they are disseminated through the media, media language will have to be added to enhance their media values. For doing this, the capability of encoding media discourse appears indispensable. According to media studies, ordinary people would imagine science as the media’s real description (Clark and Illman, 2006). Therefore, unlike the common curriculum design related to mass communication and journalism in higher education institutions, science journalists must be trained revolving reinforcing science language around green energy. This combines two major professional areas of science and communication which can be embodied by integrating green energy professional knowledge and news professional skills. It demonstrates that interdisciplinary training ought to be the

crucially up-to-date curriculum design serving as an innovative model for green-energy journalist talents in society productively. In particular, ‘agenda-setting’ becomes the training core relating to media content production, enabling the students majoring in media communication to effectively cope with science issues. Students are, in the meantime, expected to sophisticatedly associate science with people’s daily life and society. This concerns agenda-setting proficiency and empowers the news media to influence the importance of public science revolving around green energy placed on the topics of the public forum.

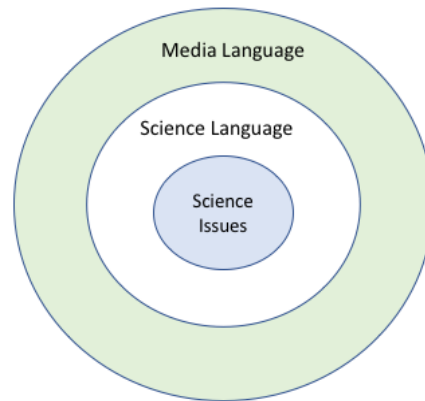


Fig. 4. Languages conveying science issues.

5. Discussion

The absence of science news in social communication must be traced back to the frontline of news production, the cultivation of talents in combining message design with interdisciplinary knowledge has been in a state of virtual neglect. The possible factor for the current scenario may be deemed the swift surge of digital new media causing the challenge for conventional news media to face a reformed media ecology. Particularly, conventional news media has an established frame that constrains the flexibility of message design and leads the media discourse to appear relatively weak. However, the vital role of user-generated content (UGC) has diluted discourse power and functioned in the de-centralization of mass communication (Peng, 2019). Furthermore, UGC has generated P/OGC referring to professional/occupational-generated content that can be more creative with the hyper-text mechanism. While the roles of UGC participate in the process of mass communication, the conventional media has to re-think its media frame, pushing itself to refine discourse design under the internet's subtle and significant effect.

In particular, conventional media must learn that the interactive relationship between the communicators and the receivers has altered its original two ends of the communication process, in which technology-artifact-centric contributions to social impact occur. In the conventional communication effect mode, empirical research on communication as the mainstream approach is to focus on ‘the receiver’ (so-call audience), including his/her information gap of new technological knowledge based on social status, educational background, habits, and age. However, today’s communication has changed with the emergence of new media, so the audience’s access to any new information has variously increased. The audience for a single medium has accordingly dispersed. With this trend, the end of production must be valued and emphasized in contemporary communication research. The end of production refers to ‘the Communicator’, who can be an individual, a group, or an institute that initiates encoding message production. The end of production also includes the profession of the communicator, the extent of the communicator’s understanding of scientific technology, and the ability of the communicator to interpret and elaborate on what scientific technology is and how it can change a society.

Reviewing China’s endeavor in developing green energy, it proclaims to achieve ‘carbon neutrality’ in 2060 and a ‘carbon peak’ before 2030, commonly referred to as the Dual Carbon goals, proposed by Xi Jinping in 2021 (Xue, 2022). To incorporate the Dual Carbon Goal into social and economic development, the government issued guidelines on the implementation of relevant goals, which has a directional effect. The guidelines clearly stated that the dual carbon goal must be incorporated into social and economic development. This means that major policies such as future economic planning must consider the Dual Carbon Goal. In this direction, every level of society needs to be fully integrated into the double carbon goal from the energy saving and emission reduction of enterprises to the green consumption of individuals to the macro infrastructure, education, society, and so on.

In particular, it is now granted that global warming has become a common concern, and contemporary scientific knowledge has a profound impact on society. Yet, a question arises: does the public accurately and fully understand green energy? To be a contemporary civic society, the questions of science must not be merely left to scientists and the media as a representation of the

public who become pivotal players in lending an impetus to public science. This requires the media and scientists to be equally important.

6. Conclusions

Once the importance of interdisciplinary talent training can be valued and constructed, it assists the academic to progress toward further research of interdisciplinary education, accordingly to deepen media-related interdisciplinary research based on communication theories. The outcome can increase focus on the encoding process in news production about green energy, responding to the new media development and social environment. In the context of maturely developing current media, green energy topics are almost interdisciplinary. It means that interdisciplinary journalists are needed especially for green energy and media communication. The contribution of the preliminary study includes the discussion on the media effect in constructing adequate media discourse in terms of scientific knowledge delivered every day. Effective social communication promotes literacy of popular science and thus represents social practice. This trend will further be paralleled by the convergent and interdisciplinary development of the new media.

Conflicts of Interest: The authors declare no conflict of interest.

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