

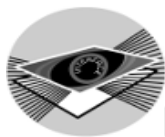
INTERFACE

-JOURNAL OF EUROPEAN LANGUAGES AND LITERATURES



02

Spring
2017



ISSN: 2519-1268

Issue 2, Spring 2017

Editor-in-Chief

Vassilis Vagios

Editorial Board

Lai, Ying Chuan (National Chengchi University)
Blanco, José Miguel (Tamkang University)
Chang, Wen Hui (Fu Jen Catholic University & Ta-Tung University)
Odendahl, Wolfgang (National Taiwan University)

Advisory Board

Takada, Yasunari Professor Emeritus, The University of Tokyo
Chang, Han Liang Professor Emeritus, National Taiwan University
Kim, Soo Hwan Hankuk University of Foreign Studies
Finglass, Patrick The University of Nottingham
Chaudhuri, Tushar Hong Kong Baptist University
Kim, Hyekyong Inje University

Assistant

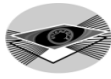
Chi-Fang Tsai

The Journal is published three times a year (February, June, October) by the Department of Foreign Languages and Literatures, National Taiwan University.

All correspondence should be addressed to the Department of Foreign Languages and Literatures, National Taiwan University, Roosevelt Rd., Section 4, No. 1, Taipei 106, Taiwan, R.O.C.

Phone: +886-2-33663215

Fax: +886-2-23645452



Issue 2 (Spring 2017)

Table of Contents

Editorial

Interdisciplinary, multidisciplinary, or transdisciplinary?

VASSILIS VAGIOS 1

Articles

Montesquieu's Political Analysis of the Woman Problem
in the *Persian Letters*

I-KAI JENG 9

Political Crisis in Rhetorical Exercises
of the Early Roman Republic

SHUNICHIRO YOSHIDA 39

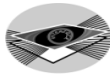
The Promotion of Environmental Literacy
under an Attention Economy Perspective

ARMIN IBITZ 51

Book Review

Querdenken gegen die intellektuelle Leitkultur
– W. G. Sebald interveniert

CHRISTIAN HEIN 75



Issue 2 (Spring 2017), pp. 51-73
DOI: 10.6667/interface.2.2017.27

The Promotion of Environmental Literacy under an Attention Economy Perspective

ARMIN IBITZ

Wenzao Ursuline University of Languages

Abstract

While information and knowledge is growing exponentially, our day continues to have 24 hours. As a consequence, we live under constant shortage of attention. We do not read anymore - we skim; information that used to be relevant for a day, is now relevant for a few hours, since we need to pay attention to the new information. And “[...] in an information-rich world, the wealth of information means a dearth of something” (Simon, 1971). Internet and new media play such a dominant role in modern life that other aspects of life are neglected. And among the most neglected areas we find the interaction with nature and wildlife. Promoting environmental literacy aims at strengthening the capacity to recognize and understand the relative health of environmental systems and set proper measures to maintain and/or restore the physical condition of those systems. However, the formation of an environmentally literate person requires a broad knowledge and ecological understanding in order to result in an intrinsically motivated green decision making. Foreign language teaching may not only contribute by raising environmental awareness but also by developing skills and competences, creating positive emotions and shaping attitudes that may lead to changes in behavior and trigger action in real life. This paper seeks to contribute to the ongoing discussion about the promotion of environmental literacy through foreign language teaching among the generation digital-born. The paper starts with a discussion of the theoretical concept of environmental literacy, and then proceeds to establish links between environmental literacy and learning, and discusses how information overload interferes with learning processes.

Keywords: attention economy, environmental literacy; language learning; environmental education; information overflow

© 2017 Armin Ibitz

This work is licensed under a [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-nc-sa/4.0/).

The Promotion of Environmental Literacy under an Attention Economy Perspective

1. Introduction

We live in an era where humans affect almost all aspects of life on our planet. Human impact has reached a level that scientists propose to refer to the current era as the anthropocene (Crutzen, 2006). Obviously, addressing the ecological challenges of the Earth's ecosystems requires substantial changes in the economic, political, societal and educational realm. However, there is doubt if we have sufficient knowledge and understanding of human-environment interactions to make environmental-sound sustainable decisions (Salmon, 2000). In the long run, we can only sustain the Earth's ecosystems and prevent ecological collapse if we enhance our understanding of human-environmental relation in all aspects, and promote pro-environmental behavior. Also the higher education sector is in strong need to re-adjust its focus in order to enable graduates to deal with current and future economic, ecological, political and societal challenges. In the future, graduates will be exposed to much more environment-related issues throughout their careers than now, requiring them to have an even deeper understanding of ecological challenges. Thus, they need to be prepared by understanding the issues and developing skills to assess and evaluate proposed measures. In order to be able to tackle ecological challenges, we are in strong demand of forming environmentally literate graduates. Across the globe, there have been efforts to promote environmental awareness and step up efforts in environmental education. For example, in 2005, the UNESCO launched its UN Decade of Education for Sustainable Development (2005-2014) (UNESCO, 2005). Within this decade, educational institutions around the world attempted to increase their efforts to educate students for a more sustainable future. Education for Sustainable Development aims to equip humans with knowledge, skills, attitudes and values necessary to

shape a sustainable future. This includes the development of necessary competences like critical thinking, imagining future scenarios and making decisions in a collaborative way. Key areas include climate change, disaster risk reduction, biodiversity, poverty reduction, and sustainable consumption.

The concept of Environmental Literacy (EL) is an approach that aims to address ecological issues by strengthening the capacity to recognize and understand the actual ecological situation but also by developing skills to evaluate proper measures to maintain or restore the physical condition of ecological systems. Unsurprisingly, the development of an environmentally literate individual requires an educator to have a broad ecological knowledge and understanding, but also a solid environment-conscious behavior. However, outcomes of educational efforts are influenced by various factors, including the intrinsically motivated green decision making processes or the learning environment. It is important to understand that students draw most of their environmental knowledge from education institutions and not from media, peers or family (OECD, 2009). In learning environments where information and knowledge overflow is normal, skimming replaces reading, and attention is easily drawn away by mobile devices. As a consequence, the build-up of in-depth understanding of complex systems (such as ecological systems) is not an easy task for students and educators. Students - like many other individuals - live under constant shortage of attention. There is no time and necessity to read and reflect anymore. Information that used to be relevant for a day is now relevant for a few hours, since we need to pay attention to the new incoming information. As Simon correctly put it “[...] in an information-rich world, the wealth of information means a dearth of something” (Simon 1971, p. 40-41). Internet and new media play such a dominant role in modern life that other aspects of life are neglected. And among the most neglected areas we find the interaction with nature and wildlife. While the boundaries between labor and leisure erode, work intrudes our private life, and parents have less time with their kids. Children spend only half as much time outdoors than their peers did two decades ago, and the consumption of entertainment media among kids (aged 8-18) exceeds 7 hours per day (Rideout et al., 2010). Childhood has moved indoors, with all its consequences, such as

declining creativity, concentration deficiencies, underdeveloped social skills, and alienation from nature (Hofferth, 2010).

2. The Concept of Environmental Literacy

The term literacy came up in the late 1800s, and interestingly was predated by the word illiteracy by several hundred years (Venezky, 1987). While the original term literacy mainly referred to the ability to read and write, the term has evolved significantly over the last centuries, particularly during the Industrial Revolution with its far-reaching social and economic changes (e.g., mandatory elementary public education). As of now, dictionaries show two definitions of the term literacy: First, the ability to read and write, and, second, the knowledge or capability in a particular field. Thus, being literate in the broadest sense means to have knowledge or competence in a certain area. Or as the OECD (“Adult Literacy”) puts it: “[l]iteracy involves a continuum of learning in enabling individuals to achieve their goals, to develop their knowledge and potential, and to participate fully in their community and wider society”. The concept of literacy has been extended to cover the ability to understand, to make informed decisions, and to act accordingly in order to address complex issues of modern society (Roth, 1992; Scholz & Binder, 2011). However, academic literature has some difficulties to agree on a narrow definition of environmental literacy (Stables & Bishop, 2001; Bowers, 1996; McBride et al., 2013). Disinger and Roth define environmental literacy as the “...capacity to perceive and interpret the relative health of environmental systems and take appropriate action to maintain, restore, or improve the health of those systems.” (Disinger & Roth, 1992, p. 2). Likewise, environmental literacy needs to be evaluated in terms of observable pro-environmental behaviors. The understanding of the concept of environmental literacy was profoundly extended by the writings of David Orr, when he raised a major issue:

“The crisis of sustainability and the problems of education are in large measure a crisis of knowledge. But is the problem as is commonly believed, that we do not know enough? Or that we

know too much? Or that we do not know enough about some things and too much about other things? Or is it that our scientific methods are in some ways flawed? Is it that we have forgotten things we need to remember? Or is it that we have forgotten other ways of knowing that lie in the realm of vision, intuition, revelation, empathy, or even common sense? Such questions are not asked often enough...”

(Orr, 1992, p. 155)

According to his point of view, educators should abstain from simplifying complex problems to an extent where connection to the context is lost. Abstracting a problem may be helpful to understand the larger picture but what is the meaning of it when it is not reflecting realities anymore and does not relate the topic with the audience? Analytical modes of teaching often use abstracting problems from the context, however, this artificial simplicity and clarity is only supportive when students are still connected to the issue. Otherwise it fails to be an effective method of teaching (Moseley, 2000; Reynolds, 2010). However, how realistic is it to expect students to get a full understanding with all the necessary details? Schneider (1997) argued that instead of in-depth details and knowledge, students should learn to ask three major questions to experts: “what can happen”, “what are the odds” and “how do you know.” Students do not have to know much of the technical details, however, they should have the skills to evaluate the integrity of proposed environmental measures. To be able to address basic environmental issues students need to be able to understand different point of views, analyze problems, and take informed action. Among the most required skills are problem solving and critical thinking skills which enable them to apply new knowledge to the individual’s existing environment. Studies have revealed the positive relationship between environment-based education and critical thinking (Ernst & Monroe, 2004). However, most scholars see the detailed contextual understanding of an ecological challenge as a precondition of environmental literacy. Only this allows analysis, synthesis, and evaluation in order to make informed decision making. Simmons (1995) studied the components of environmental literacy

I N T E R F A C E

proposed throughout the academic literature, and drafted a framework for EL, where he identifies several major components as the basis of EL: affect, ecological knowledge, socio-political knowledge, knowledge of environmental issues, cognitive skills, and environmentally responsible behaviors. Thus, environmental literacy is about skills, activities, practices, and connectedness based on knowledge, and it aims at the capacity of individuals to act in daily life based on environmental sound principles.

In regards of EL at higher education institutions, it would mean that environmentally literate students should develop the knowledge, tools, and sensitivity to adequately address an environmental problem in their professional field. However, environmental considerations are not only present at work/study but also in daily behavior, and private decision making processes. The environmentally literate student would thus include environmental considerations in all aspects of life. While environmentally conscious people have developed awareness and knowledge about environmental problems, environmentally literate individuals adopt lifestyles, behaviors, and make decisions and choices that mirror their understanding of the potential harm to the Earth and the Environment. EL requires students to go beyond what has typically been expected of them, and collect a wide range of knowledge that ultimately leads to an intrinsically motivated decision making.

2.1 The Literacy Gap and How to Form Environmentally Literate Individuals

Despite intensifying environmental education efforts and despite the spread of the environmental literacy concept - that has helped to implement numerous programs - reality shows that large parts of the student population still lack the basic environmental knowledge, attitudes or emotional attachments that would enable them to restore public health, preserve natural resources, limit energy needs, and more importantly, engage themselves in a movement towards a more sustainable future. While the demand and need for EL is great, a

number of reasons have prevented EL from reaching its full capacity. The fact that environmental literacy has not become an integral part of the curriculum indicates that the issue has not reached top-level decision making bodies, and thus does not enjoy top priority yet. As a consequence, problems arise from the lack of instructional time to apply environmental literacy approaches, and the lack of resources (Stevenson et al., 2014). In addition, since standardized tests do not include an assessment of environmental literacy skills, educators prefer to spend the limited time on test related areas. Moreover, educators fear that they do not possess adequate content knowledge for implementing environmental literacy approaches in their classes. A major boost to promote environmental literacy could be provided by integrating of environmental literacy in the overall curriculum as well as improving access to environmental literacy related lesson plans, and activities. Increased training programs could encourage foreign language educators to integrate EL-based elements in their course structure.

The ultimate goal of environmental literacy is developing the capacity for action and increase participation. However, the process of engagement is a very complex issue. In general, the formation process of an environmental literate individual can be divided into five major phases (CEL, 2007): While the first phase covers the formation of awareness between human, life and earth, the second phase is characterized by creating knowledge and understanding about humans, natural systems and processes (Table 1). The third phase embodies the involvement of attitudes of appreciation and the formation of concern for ecological issues. Phase four includes the development of problem solving skills as well as critical thinking skills. Only after having gone through the previous four phases, action and participation for the environment will occur. However, the model serves more as a blue print indicating a loose hierarchy from the simple to the more complex. While in theory, each phase builds on the previous step, in reality learning and development steps may overlap and occur simultaneously. However, in order to achieve EL no step can be left out.

I N T E R F A C E

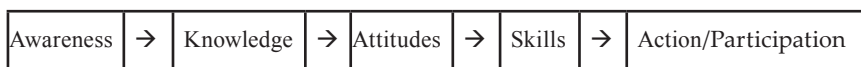


Table 1: Five Elements of Achieving Environmental Literacy

(Source: Campaign for Environmental Literacy, <http://www.fundee.org>)

Since changes towards a pro-environmental behavior - as we all know - are not easy to accomplish, it requires continuous efforts, a step-by-step build-up of environmental competences, collecting personal experience and emotional attachment to the issue. It is a combination of knowledge, values, and attitudes that is needed in order to foster EL among students. Besides having profound knowledge about the environment to secure effective teaching, educators need to demonstrate their environment-friendly behavior and attitude to be credible. All in all, universities take a vital role in promoting a more sustainable life-style (Müller-Christ, 2014; Cortese, 2003).

3. An Attention Economy Perspective on Promoting Environmental Literacy

For centuries scarcity of information and information distribution was a limiting factor. In 1472, the library of the Queens College, Cambridge, listed about 200 volumes. This is not far from the amount a single person can carry around on his e-book reader or a similar mobile device nowadays. While at that time, getting enough material to read was the major concern, we are now more worried about how to deal effectively with the massive information flow and how to filter relevant from irrelevant information. While information technology is supporting our demand for more information, there are physical limits of absorbing information for body and brain (Pashler & Sutherland, 1998). In the information age, knowledge was important, but in the era of infobesity, we may ask ourselves the question what is the optimum amount of information we can handle? Knowledge and information is

growing exponentially, and the information overflow is not only limited to consumers, managers, employees, educators, parents, but also to students.

Defining attention as the focused mental engagement on a certain element of information, we immediately realize how limited attention is. Everybody who tried to listen to two messages at the same time knows that we face natural barriers of comprehension. Focusing on one message may be successful but listening to both will trigger substantial difficulties. Doubtless, information technology eases the way of communication among people. However, in response of the extensive application of information technologies across many disciplines of life, more people have turned into producers of information and knowledge, which then has to be communicated to people. As a result, attention has developed into a scarce resource on the planet. Based on the fact that the human ability to multitask and allocate simultaneous attention is highly limited, we need to admit that attention is a new scarce resource: one has to decide on how to spend attention (Kahneman, 2011).

Thinking of attention as of a market, there are suppliers and consumers. Various forms of media, news companies, publishers, marketing companies, but also common people, comprise the supply side, while individuals (as consumers) represent the demand side. The increased amount of knowledge and information enlarges the supply. However, consumers need to make decisions on how to spend their attention. If one is in short supply of attention one may want more. Since attention is trade-able and buyable (such as by outsourcing of activities), attention has become a valuable commodity. In a way it can be argued that attention serves as the new currency (Davenport & Beck, 2013). Regarding the management of financial resources, we have – more or less – learned to deal with it and apply complex decision making processes before we spend money. However, as marketing teaches us, strolling around in a mall seduces consumers to impulsive shopping. In a similar way, strolling around in an information-rich environment (e.g. internet) may result in impulsive spending of attention. As a consequence, we need to apply appropriate decision making processes regarding the spending of attention too.

I N T E R F A C E

When attempting to maximize attention, we realize that attention can be distinguished into several categories. In their work Davenport and Beck (2013) propose six major types of attention (Figure 1). Captive attention refers to the individual's intrinsic interest, and as we know,

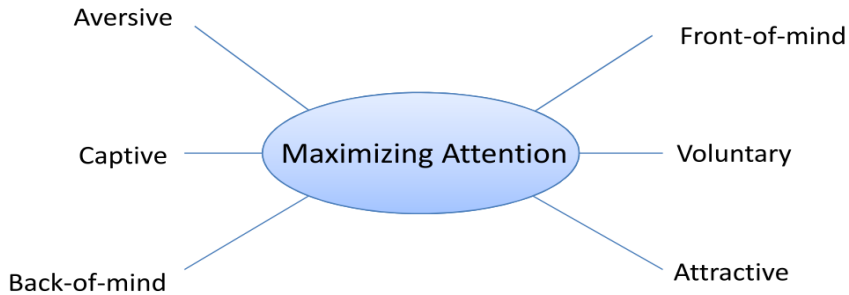


Figure 1: Six types of attention according to Davenport and Beck, 2013

humans have a deeply curious nature (Stafford, 2012). Unlike other mammals, we allocate more resources for playing and discovering new things. Voluntary attention describes the attention one pays attention to what one has to pay attention to but also what one wants to pay attention to. While the first two categories focus on self-driven aspects of human attention, aversive attention stems from the motivation to avoid negative consequences (“carrot-and-stick”). Attractive attention refers to attention that develops out of expectations of positive experiences. Given that our human information processing capabilities are limited, back-of-mind attention frees resources for other activities, while front-of-mind attention requires effortful, conscious, and explicit focus (Kahneman, 2011). Unlike back-of-mind attention, the front-of-mind attention requires the allocation of resources, and overuse can result in cognitive depletion and fatigue.

3.1 Attention, Learning and Environment Literacy

The most common measurement of attention is the proxy time. However, since one can spend many hours reading a language book without effectively paying attention, time seems a questionable proxy. While in the industrial age, time was the limiting factor to output, the information age was heavily shaped by the access to information. Now, in an information-rich society, capacity to handle and deal with massive flows of information is the new limiting factor (Table 2).

Age:		Limiting factor
Pre-industrial age	⇒	natural resources
Industrial age	⇒	time
Information age	⇒	access to information
Information-rich age	⇒	attention

Table 2: The change of limiting factors over developmental stages

(Source: Author’s own illustration)

Given that learning without paying attention is impossible, and attention is a limited resource, the determining factor to strengthen the learning process is finding a proper mean to deal with attention spending. Considering attention as a psychological/cognitive process, items of information come into our awareness, attention is spent to a particular item, and then decisions are made whether to act or not (Table 3). There is a causal relationship between awareness, attention, and action. Awareness is thus not equal to attention, but precedes attention. Only when information reaches a certain threshold of meaning for us, awareness turns into attention, and possibly triggers action. Consequently, teaching needs to aim at increasing the level of meaning

I N T E R F A C E

for learners in order to achieve desired outcome.



Table 3: Causal relationship between Awareness, Attention and Action

(Source: Davenport & Beck, 2013)

In times where attention management is a key to successful learning, educators realize that many students are unable put information into perspective because of a shortage of attention and chronic information fatigue. As a result, the quality of decision making is negatively affected (Hwang & Lin, 1999). Learners with chronic information fatigue are unable to make decisions or cope in other ways, they show irritability and anger, suffer from pain in the stomach and muscles, feel helpless frequently, and show signs of lethargy (Ruff, 2002). They may suffer from insomnia and feel constantly exhausted, and do not have hobbies or do not show great interest in leisure activities.

The attention economy perspective provides us with three major categories of tools to manage attention: Attention-getting tools, Attention-structuring tools, and attention-protection tools. First, attention-getting tools aim to draw attention at all, and the focus lies on the creation of a learning environment that stimulates the captive attention (e.g., evocative pictures/posters, short clips, provocative questions). Second, attention-structuring tools seek to uphold attention. In a classroom context this could include non-linear structures, games, interactive websites, books, storytelling, and life-like and real environments. Linking issues to learners' real life contexts provides a feasible method to spur participation. This also includes setting goals that are meaningful for life, and discussing the flow of attention stream.

Third, attention-protection tools aim to provide shelter from too much information. The focus here lies in sorting out the relevant from the irrelevant, and to save attention for the important issues. Based on the assumption that learning of a new skill is a front-of-mind matter, successful learners will be those who succeed in attention management. However, this means to refrain from trading attention in order to receive free goods and services (e.g., social network platforms, etc.). While over time we have learned that buying something in a shop is based on a trade (payment against good), we still face massive issues to acknowledge that making use of social networks - such as Facebook, Instagram, Twitter, etc. - also requires a trading. Although most common social networks are free, most of us are not aware that we still have to pay for them, not with money but with attention - the new currency. The average German mobile phone user uses his phone 2.5 hours while only 7 minutes for making telephone calls (Markowitz, 2015). It is not the time spent on the phone, but the amount of interruptions that sum up and distracts us. Smart phone users unlock their mobiles 88 times on average per day, 35 times for minor tasks (e.g., checking the time), and a staggering 53 times for bigger tasks (such as receiving and sending messages, etc.). Since we are disturbed every 18 minutes on average, our attention is drawn away frequently, and concentration on work or study suffers. The 2015 Nielsen Media Index reveals that Taiwanese users spend even more time on their smart phones. They are an average of 3 hours and 38 minutes online per day (Nielsen, 2016). This represents 55 minutes longer than the world's average. In other words, Taiwanese users spend more than one full day per week (over 25 hours) online.

While in the modern working environment, electronic devices are indispensable, many of us lose sight of the impact the devices have on our behavior and decision making. However, it is not only the time spent with electronic devices that matters. Prolonged sitting has adverse effects on human health (e.g., forward neck posture, slouched posture or rounded shoulders), and the body position may not only influence the respiratory function but also human behavior (Kang et al., 2016). Investigating the behavioral impact of electronic devices on humans, a study showed that the size of the electronic devices has an

I N T E R F A C E

impact on human decision making (Bos & Cuddy, 2013). Due to their more contractive body posture participants interacting with smaller electronic devices showed a more passive and less assertive behavior than participants working on a desktop PC applying a more expansive body posture (Huang et al., 2011).

In Taiwan, there are governmental efforts to protect children from extensive use of electronic devices. In January 2015, lawmakers passed a revision to the Protection of Children and Youths Welfare and Rights Act to cover the use of electronic devices (The Straits Times, 15 January 2015). Under the new regulation children under two years are banned from using electronic devices, while juveniles “may not constantly use electronic products for a period of time that is not reasonable”. However, since the amendment fails to define what a “reasonable” amount of time is, the law will be not more than a symbolic gesture at best.

The market for attention has just been established, and in the near future, there will be even more information competing for less attention. Excessive spending of attention leads to severe consequences. Information fatigue results in poor decision making, eventually translating into slow progress in learning and substantial loss of interest in the subject. Bridging the gap between attention-getting infotainment environments from mobile devices outside class and “boring information” in classrooms is increasingly harder to achieve.

Without question, technologically based information is compelling to us as our brains find the process of communicating with others deeply rewarding. However, technological distraction often leads to impaired self-control as our devices exceed our capacity to use them effectively. The application of information technology in education itself does not automatically enhance teaching and improve learning processes (Wright, 2008). While a majority of teachers (77%) sees the use of the internet and digital search tools have had a “mostly positive” influence on students’ research habits, 87% claimed that these technologies contribute to the formation of an “easily distracted generation with short attention spans”. And some 64% indicated that digital technologies “do

more to distract students than to help them academically” (Purcell et al., 2012). And people who are engaged in teaching can observe the decrease in concentration-spans among students year by year. Attention deficits due to information overload and decreasing spans of concentration are major obstacles to generate environmentally literate students. This is particularly true, since EL calls for in-depth understanding of the issue and seeks to avoid simplification and abstract modeling. Thus, what role should gaming play in the promotion of environmental literacy? Video games may provide a significant boost in learners’ motivation, and they may increase (environmental) knowledge and consciousness. However, there is doubt to what degree video games/online games are an appropriate method to develop environmental literate students (Gee, 2003; Squire, 2011). Applying computer games for the purpose of developing environmental literacy, educators need to assess clearly, if the game promotes social interaction, participation in real life and prevents alienation from nature. While computer games may have positive effects on foreign language learning, it needs to be considered if these games also contribute in the development of environmental literacy (Chik, 2012; Hopper, 2002). As of now, research on the integration of games in environmental education is very limited (Arslan et al., 2011; Ballantyne & Packer, 2005; Hewitt, 1997).

On the other hand, lessons purely based on textbooks stand no chance to compete with mobile devices, and have little chances of receiving much attention. Texts - particularly long ones - have lost their ability to maintain attention, while images become more powerful (Rosen, 2005). Incrementally, we seem to re-transform into an image-based culture. However, if someone’s attention is constantly wandering around and concentration spans are short, the best solution to draw attention is to offer very few pieces of information at a time. Besides, new information must be different from anything around it to generate captive, voluntary attention. Another promising approach is to address the most basic needs possible. As a teacher we have to understand that someone’s front-of-mind attention can only be directed towards a task after having created positive attachment to the issue before. Thus, the topic needs to be connected with the person, and bring in information about the

I N T E R F A C E

learner as much as possible. Issues need to be tailored to the audience and closely relate to the individual. This can be achieved by approaches based on the story line method aimed at connecting the topic with the person (Bell et al., 2007). Hands-on teaching (experiments and conclusions), outdoor education, and field trips could mean a major boost to spur students' motivation. The role of the educator is to create learning environments that enable the development of needed skills and stimulate pro-environmental behavior. Informal learning contexts provide life experiences and foster pro-environmental attitudes.

As for Taiwan, both foreign language acquisition and environmental education receive much attention from policy makers. However, they are treated as two separated, not linked areas. In 2010, the Legislative Yuan passed the Environmental Education Act, which aims at integrating mandatory environmental education for Taiwanese schools, businesses and organizations (China Post, May 19, 2010). Through this legislation a larger portion of the population is exposed to discussions about environmental issues - a first step towards rising awareness levels. However, environmental knowledge and level of environmental awareness do not correlate with increased environmental action and environment responsible behavior. As the study of Hsu and Lin (2015) suggests, individuals with higher knowledge levels about carbon reduction have a stronger environmental consciousness, and incline to have higher intentions in carbon reduction but do not take concrete actions in their life. Consequently, increasing environmental awareness levels and consciousness among the public are essential, but focus must be laid on fostering changes towards environmental behavior of individuals to ensure that environmental action is stimulated. Liu et. al (2015) showed in their study that many educators fail to show environmental friendly behavior too. A national survey of schoolteachers' environmental literacy was conducted in Taiwan in order to set up a baseline for assessing the effectiveness of environmental education policy. The study included educational institutions at all levels and regions, and revealed that local educators do have satisfactory levels of environmental knowledge and attitudes but they show low degrees of environmental action. Elementary school teachers performed better

than high school teachers. This underlines the necessity to develop environmental literacy among educators (and administrators) too, since they take the position of essential role models for learners.

4. Conclusion

While concerns for the environment have steadily increased over the past decades, there has been little substantial change in human individuals' behavior to reduce the impact on the global ecosystem. The concept of environmental literacy aims at promoting awareness, knowledge on environmental issues but also seeks to trigger changes in attitudes and behavior. However, the rise of the information age and the penetration of our daily lives by information technology threaten the development of environmentally literate students. Although awareness about environmental issues is increasing constantly, real action and changes in behaviors are hard to achieve. In an environment where more information is competing with less attention, the management of attention takes a key role. Unless we find a way to deal with attention spending, grasping complex learning contents (such as ecological systems) will be infeasible. Furthermore, it triggers negative consequences for the environment, as most environmental challenges are complex in their nature. As this paper argues the promotion of environmental literacy can only lead to satisfying results when it is accompanied by the implementation of attention management methods. As a consequence, we are in strong need to continue developing new tools and instruments at all educational levels that enable the generation digital-born in sustaining their capacity to grasp complex environmental systems, and feeling responsible to take care of their environment.

The concept of environmental literacy provides an approach that allows the combination of foreign language teaching with the formation of environmentally responsible students. While foreign language teaching has a history on integrating topics that would otherwise be neglected by the curriculum, foreign language instructors are said to have a

I N T E R F A C E

broad international perspective on global issues since many of them finished their studies abroad, and that enables them to draw meaningful comparisons between domestic and international developments. Thus, foreign language teaching not only provides a good starting point to raise environmental awareness but also allows the development of skills and competences, creating positive emotions and shaping attitudes that may lead to changes in behavior and trigger action in real life. However, the development of environmental literate graduates faces severe obstacles due to substantial societal changes and an obvious shortage of attention. Getting more in touch with nature and generating a sense of responsibility to protect the environment requires a rethinking of the overall education policy and the integration of environmental literacy goals in the curriculum. Moreover, it also requires a slow-down of our busy daily routine and a re-assessment of our entire digital life-styles that obviously increases physical and emotional distance to nature.

References

- Arslan, H. O., Moseley, C., & Cigdemoglu, C. (2011). "Taking attention on environmental issues by an attractive educational game: Enviropoly", *Procedia-Social and Behavioral Sciences*, 28, 801-806.
- Ballantyne, R., & Packer, J. (2005). "Promoting environmentally sustainable attitudes and behaviour through free-choice learning experiences: what is the state of the game?", *Environmental Education Research*, 11(3), 281-295.
- Bell, S., Harkness, S., & White, G. (2007). *Storyline: past, present & future*. Glasgow: Enterprising Careers, University of Strathclyde.
- Bos, M. W., & Cuddy, A. J. (2013). "iPosture: The size of electronic consumer devices affects our behavior", *Harvard Business School Working Paper*, No. 13-097, May 2013.
- Bowers, C. A. (1996). "The cultural dimensions of ecological literacy", *The Journal of Environmental Education*, 27(2), 5-10.
- CEL (Campaign for Environmental Literacy). 2007. Retrieved on January 4, 2017 from <http://www.fundee.org/>.
- Chik, A. (2012). "Digital gameplay for autonomous foreign language learning: Gamers' and language teachers' perspectives", in *Digital games in language learning and teaching*, pp. 95-114). London: Palgrave Macmillan UK.
- China Post. (2010). "Environmental education mandatory in Taiwan." 19 May 2010. Retrieved on April 29, 2016 from <http://www.chinapost.com.tw/taiwan/national/national-news/2010/05/19/257057/Environmental-education.htm>.
- Cortese, A. D. (2003). "The critical role of higher education in creating a sustainable future", *Planning for higher education*, 31(3), 15-22.
- Crutzen, P. J. (2006). "The 'anthropocene'", in Ehlers, E. and T, Kraft (eds.) *Earth system science in the anthropocene*, pp. 13-18. Berlin, Heidelberg: Springer.
- Davenport, T. H., and J. C. Beck (2013). *The attention economy: Understanding the new currency of business*. Cambridge, Ma.:

I N T E R F A C E

- Harvard Business Press.
- Disinger, J. F., and C. E. Roth, (1992). Environmental Literacy. ERIC/CSMEE Digest.
- Ernst, J., & Monroe, M. (2004). "The effects of environment-based education on students' critical thinking skills and disposition toward critical thinking", *Environmental Education Research*, 10(4), 507-522.
- Gee, J. P. (2003). "What video games have to teach us about learning and literacy", *Computers in Entertainment*, 1(1), 20-20.
- Huang, L., A. D. Galinsky, D. H. Gruenfeld, and L. E. Guillory (2011). "Powerful Postures Versus Powerful Roles: Which Is the Proximate Correlate of Thought and Behavior?" *Psychological Science*, 22(1), 95-102.
- Hewitt, P. (1997). "Games in instruction leading to environmentally responsible behavior", *The Journal of Environmental Education*, 28(3), 35-37.
- Hofferth, S. L. (2010). "Home media and children's achievement and behavior", *Child Development*, 81(5), 1598-1619.
- Hopper, T. (2002). "Teaching games for understanding: The importance of student emphasis over content emphasis" *Journal of Physical Education, Recreation & Dance*, 73(7), 44-48.
- Hsu, J. L., & Lin, T. Y. (2015). "Carbon reduction knowledge and environmental consciousness in Taiwan", *Management of Environmental Quality: An International Journal*, 26(1), 37-52.
- Hwang, M. I., & Lin, J. W. (1999). Information dimension, information overload and decision quality, *Journal of information science*, 25(3), 213-218.
- Kahneman, D. (2011). *Thinking, fast and slow*. New York: Macmillan.
- Kang, K. W., S. I. Jung, D. Y. Lee, K. Kim, and N. K. Lee (2016). "Effect of sitting posture on respiratory function while using a smartphone", *Journal of Physical Therapy Science*, 28(5), 1496-1498.
- Markowetz, A. (2015). *Digitaler Burnout: Warum unsere permanente Smartphone-Nutzung gefährlich ist*. Berlin: Droemer.
- McBride, B. B., C. A. Brewer, A. R. Berkowitz, and W. T. Borrie (2013). "Environmental literacy, ecological literacy, ecoliteracy:

- What do we mean and how did we get here?" *Ecosphere*, 4(5), 1-20.
- Müller-Christ, G., S. Sterling, R. van Dam-Mieras, M. Adomßent, D. Fischer, and M. Rieckmann (2014). „The role of campus, curriculum, and community in higher education for sustainable development—a conference report“, *Journal of Cleaner Production*, 62, 134-137.
- Nielsen. (2016). *The Dawn of the Extended Screen in Taiwan*. Retrieved on January 3, 2017 January 3, 2017 from <http://www.nielsen.com/content/dam/nielsen/tw/docs/The-Dawn-of-the-Extended-Screen-in-Taiwan%202016en.pdf>.
- Liu, S. Y., S. C. Yeh, S. W. Liang, W. T. Fang, and H. M. Tsai (2015). “A National Investigation of Teachers’ Environmental Literacy as a Reference for Promoting Environmental Education in Taiwan”, *The Journal of Environmental Education*, 46(2), 114-132.
- Moseley, C. (2000). “Teaching for environmental literacy”, *The Clearing House*, 74(1), 23.
- OECD. (2009). *Green at Fifteen?: How 15-Year-Olds Perform in Environmental Science and Geoscience in Pisa 2006*. Paris: OECD.
- OECD. “Adult Literacy”. Retrieved on April 27, 2016 from <http://www.oecd.org/edu/innovation-education/adultliteracy.htm>.
- Orr, D. W. (1992). *Ecological literacy: Education and the transition to a postmodern world*. Albany, NY: Suny Press.
- Pashler, H. E., and S. Sutherland, (1998). *The psychology of attention*(Vol. 15). Cambridge, MA: MIT press.
- Purcell, K., L. Rainie, A. Heaps, J. Buchanan, L. Friedrich, A., Jacklin, ... & K. Zickuhr (2012). *How Teens Do Research in the Digital World*. Pew Internet & American Life Project.
- Reynolds, H. L. (2010). *Teaching environmental literacy: Across campus and across the curriculum* (Vol. 38). Bloomington, IN: Indiana University Press.
- Rideout, V. J., U. G. Foehr, & D. F. Roberts (2010). *Generation M2: Media in the Lives of 8-to 18-Year-Olds*. Henry J. Kaiser Family Foundation.
- Rosen, C. (2005). “The image culture”, *The New Atlantis*, 10, 27-46.

I N T E R F A C E

- Roth, C. E. (1992). *Environmental Literacy: Its Roots, Evolution and Directions in the 1990s*.
- Salmon, J. (2000). "Are we building environmental literacy?", *The Journal of Environmental Education*, 31(4), 4-10.
- Schneider, S. H. (1997). "Defining and teaching environmental literacy", *Trends in ecology & evolution*, 12(11), 457.
- Scholz, R. W., & C. R. Binder (2011). *Environmental literacy in science and society: from knowledge to decisions*. Cambridge: Cambridge University Press.
- Simmons, D. (1995). "Developing a framework for national environmental education standards" [Working paper], *The NAAEE standards project: Papers on the development of environmental education standards*, 9-58.
- Simon, H. A. (1971). "Designing organizations for an information-rich world", *Computers, communication, and the public interest*, 37, 40-41.
- Squire, K. (2011). *Video Games and Learning: Teaching and Participatory Culture in the Digital Age. Technology, Education--Connections (the TEC Series)*. New York: Teachers College Press.
- Stables, A., and K. Bishop (2001). "Weak and strong conceptions of environmental literacy: Implications for environmental education", *Environmental Education Research*, 7(1), 89-977
- Stafford, Tom. Why are we so curious? 19 June 2012. Retrieved on January 3, 2017 from <http://www.bbc.com/future/story/20120618-why-are-we-so-curious> (accessed).
- Stevenson, K. T., Carrier, S. J., & Peterson, M. N. (2014). "Evaluating strategies for inclusion of environmental literacy in the elementary school classroom", *Electronic Journal of Science Education*, 18(8).
- The Straits Times. Lee Seok Hwai. "Taiwan revises law to restrict amount of time children spend on electronic devices". January 15, 2015. Retrieved on April 26, 2016 from <http://www.straitstimes.com/asia/east-asia/taiwan-revises-law-to-restrict-amount-of-time-children-spend-on-electronic-devices#xtor=CS1-10>.
- Venezky, R. L. (1987). *The Subtle Danger: Reflections on the Literacy*

Abilities of America's Young Adults. Princeton, NJ: Center for the Assessment of Educational Progress, Educational Testing Service.

UNESCO. (2005). "Education for Sustainable Development (ESD)". Retrieved on April 22, 2016 from <http://www.unesco.org/new/en/education/themes/leading-the-international-agenda/education-for-sustainable-development/>.

Wright, J. M. (2008). "Web-based versus in-class: An exploration of how instructional methods influence postsecondary students' environmental literacy", *The Journal of Environmental Education*, 39(2), 33-46.

[received October 4, 2016
accepted January 17, 2017]

