

Applying Alternative Teaching Methods to Impart a Rounded, Liberal Arts and Sciences (LAS) Education: Students' Reflections on the Role of Magazines as Instructional Tools

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Abstract

In a constantly and rapidly changing social world, students from all disciplines ought to attain a rounded education within the tradition of a "Liberal Arts and Sciences" (LAS) context. Students outside of the natural sciences must be encouraged to appreciate the place of those sciences in their lives. Conversely, students in the natural sciences must be encouraged to envision the role of other subjects in their lives. In order to accomplish this, however, we need to go beyond basic instructional approaches by applying alternatives such as using magazines and newspapers. This paper reports students' reflections on the use of newspapers as supplementary instructional materials to enhance learning. Data were collected from an introductory liberal arts physics course using a survey instrument. The survey had five descriptive measures: student perceptions; creativity based on activities learned; ability to link concepts learned in class to articles in the news journal; ability to impart knowledge acquired; and identifying lessons based on a case study of a selected news article from the newspaper. Student reflections indicate that magazines can effect a positive learning experience and stimulate curiosity to read. It is concluded that this approach can be used to enhance student motivation and persistence in introductory classes, particularly in schools where resources are limited.

Keywords: improvisation, Liberal Arts and Science education, magazines, student reflections.

1. Introduction

This study sought to determine the impact of the use of improvised instructional materials on student motivation to read; reinforcement of science concepts; and ability to link classroom content to improvised materials. Educators commonly complain that students do not read class material, and that when they do, they tend to read the absolute, required minimum. Instructors, therefore, often wonder about how to enforce reading compliance. In contrast, most students spend a lot of time on social and news media than on their school work. Therefore, there is need for educators to devise instructional approaches, preferably those that meet the students where they are in terms of level of knowledge. In addition, educators in both K-12 and higher education are aware of the inadequate resources at their disposal. And so, even in well-funded schools and higher education institutions, there is always a need for instructor creativity and improvisation to reinforce some concepts.

The use of newspapers and magazines in classrooms is widely applied in language and literature classes. The driving factors have been the unique opportunities that these teaching resources bring to the learning environment (Vavla, 2009), namely: (1) *authenticity*; they bring real life situations into the learning process, which helps to promote student engagement; (2) *informative*; they make both the teacher and students to be abreast with advances in technology, which may not be available in other print media; (3) *emotional connectivity*; students can easily connect what they learn to their experiences. The materials are directly relevant to their lives; (4) *entertainment*; the diversity of issues covered give students a fun learning experience. The colorful pictures make them appeal to students of all age groups as well; and (5) *simplicity*; they contain simple scientific terms to accommodate various levels of readers. Typically, these papers are written by various authors with different writing styles. This diversity in writing models provides a vast choice for the learners as well.

The use of magazines as supplementary instructional material motivates students to be in control of their learning (Mysliwiec, Shibley, Ivan, & Dunbar, 2003). Another advantage of using newspaper and magazine collections as teaching and learning tools is that the old papers are generally available at no cost. In addition, research shows that exposure to these newspapers and magazines also prepares students to become informed and active citizens, both in their communities and nation-building. Furthermore, integrating newspapers and magazines into the classroom makes learning and teaching more understandable and real. Improvised instructional strategies help to reinforce student comprehension, interpretation, curiosity and concentration. In

addition, they help to cultivate student self-actualization, confidence in the material, and improves the students' ability to read and think critically (Oliveras, Márquez, & Sanmartí, 2011).

Despite these advantages, there are several challenges that instructors applying this mode of improvisation must be aware of and try to surmount. One of the challenges is that the newspaper articles could be on new discoveries, which may not be available in reference textbooks for the course. Also, additional information on the same discovery may not be available and therefore, finding similar information for verify challenge for instructors. Each newspaper edition comes with different articles, and this makes it difficult for instructors to develop continuous lessons on new articles. However, to circumvent this problem, old newspapers or magazines can be used instead. Instructors need to be careful when using copyrighted materials. Another downside of newspaper and magazine articles is the lack of variations in the content, and this forces instructors to look for other resources to provide adequate coverage of the topic or concepts being taught.

2. Methodology

The research was based on the following research questions: (1) Can the use of improvised print-based teaching materials stimulate student interest and enhance learning? (2) To what extent can local newspapers/magazines reinforce student learning? and (3) What are students' views about incorporating improvised teaching materials in the classroom activities? What problems could arise if this method is used extensively as a teaching tool?

Data for this study were collected using a researcher developed survey. The sample comprised 12 students taking an introductory liberal arts physics course at a Midwestern university in USA. The students were asked to select and reflect on the magazine articles of their interest. For purposes of this study, the magazines themselves were pre-selected so that it would be easier to assess the impact and learning experience of each student. Descriptive survey techniques were used to determine the impact of newspapers/magazines on student motivation and grasp of the concepts. In addition, the students reflected on their perception and understanding of the articles in relation to the concepts they learned in class.

A questionnaire with five reflection questions was used in this study:

- Question 1: What three advantages did you identify in using newspapers/magazines to reinforce your understanding of science concepts?
- Question 2: Describe any three activities that you found interesting in the newspaper/magazine, and explain how it is linked to science concepts that you learned in class.
- Question 3: What skills/competencies did this newspaper or magazine article develop in your understanding of science?
- Question 4: What two sections of the local newspaper did you find most interesting and how the sections were linked to your knowledge of science?
- Question 5: Based on the newspaper articles that you chose, reflect on your experience(s) or lessons from derived from reading the news article.

No instructor support was offered to students to complete these reflections. Results from this reflective survey are presented in the next section.

3. Findings

Student responses for the five questions are presented in the order of the research questions below:

3.1. Question 1: What three advantages did you identify in using newspapers/magazines to reinforce your understanding of science concepts?

Students reported that they found articles in the newspapers/ magazines to be informative and enlightening. One student noted: *"Using newspapers or magazines makes you think a little harder than normal."* Put differently, the use of magazines/newspapers seems to foster "critical thinking", a major element of education that is clearly missing among many students today. Many students simply memorize information (usually mere definitions of concepts) and simply try to spew it out in an exam, without giving it much thought as to what it really implies beyond the mere definition.

Another student noted that: *"Images used in the magazines help make everything seem more real rather than just explaining with words. Newspapers and magazines give you real life examples of science being used in everyday life."* This comment brings out a real irony that is barely noticed by many. The "natural sciences" are also known as the "hard" sciences. Unlike what many people think, this is not because the natural sciences are "more difficult" than the other subjects but rather because they deal with "concrete" material objects, usually of a tangible nature and which surround us in our everyday life. Yet, to the ordinary person, "science" tends to be perceived in "mystical", almost supernatural, abstract terms. For example, the use of symbols, equations and formulas, completely mystifies these subjects and makes them seem like the realm of a "gifted" few among us. These objects in science are removed from the everyday reality that they are a basic and integral part of. For instance, by referring to something as CaCO₃ (Calcium Carbonate), we remove this very common

substance from its simple everyday encounter (for example, the classroom chalk-stick; soap scum). Words like “aeration” in biology or chemistry sound complex but it is a simple reference to processes that involve “air” or “space”. We aerate our body tissues by breathing air in and out, every second of our lives. “Oxidation” is a complex term that refers to oxygen interacting with other elements. Yet, we encounter the brown stuff, *rust*, and *rusting* all the time in our everyday life. Simple “rust” however, becomes a complex substance referred to as Ferric Oxide (Fe_2O_3). Yet, the browned head lettuce in the refrigerator or the browned avocado fruit, is simply the same process of “oxidation”. Similarly, how many people are aware that “diamond”, the element responsible for the death of millions of people in places like Sierra Leone or Liberia, is the very same element (Carbon) as in charcoal!! The difference is that the molecules in each are arranged differently and, therefore, reflect light differently.

Unfortunately, in the minds of many people, the reality of subjects like Physics or Chemistry is envisioned in objects “out there” in some laboratory (chemicals; test-tubes, complex machinery and wiring, protective gear, etc.), detached from our everyday experiences. Yet, Chemistry constitutes the very basic elements of every single thing in existence, and of every part of our physical bodies (Calcium in bones; Iron in blood; Carbon and Nitrogen in muscle, Carbon compounds in fat, etc.). Likewise, every item we consume everyday (fruits, vegetables, meat, etc.) is nothing more than chemicals. On the other hand, physics is involved in virtually every activity we engage in; for example, in speaking or singing; chewing and swallowing food; lifting objects; walking; sleeping; blood flow in our bodies, water supply in our homes, farming, and medical practice.

There is, therefore, a dire need to bridge the gap between classroom learning and its link to the world of everyday life. Consistent with this observation, some students in the survey indicated that newspapers or magazines provided real world examples, which helped them to connect with the material learned in class. The students indicated that part of what made this connection possible was that the material in the papers was easier to comprehend. This would be as expected since, unlike textbooks, magazines and newspapers are written for the general audience. Students further indicated that (unlike long, textbook Chapters) the sections were short enough to motivate them to keep reading. Another unique feature identified was that the pictures and bold face typesetting helped them to retain information on important issues. This seems to fall in line with students (and even teachers) who believe themselves to be “visual learners” and this is becoming more and more the norm. In fact, for quite some time, many textbooks in many subjects are using pictures, photographs and cartoons as integral parts of their content.

Students also found these magazines to play an important role in learning especially for communities without adequate resources, such as the internet. In fact, one student noted: *“Newspapers/magazines can be accessed by people that live in rural areas without a stable internet connection. Newspapers and magazine articles from a reliable source have built-in credibility. Magazines and newspapers appeal to those that (by choice) prefer a physical medium over a digital one.”* Other observations were that newspapers and magazines provide learning opportunities to diverse audiences. Students also reported that magazines allowed people to realize the application of concepts in their everyday lives. One student noted: *“People read newspapers and magazines on a day-to-day basis, but they don't read academic textbooks. So, they can still be informed about the application of physics and science through their lifestyle.”* In essence, all this reaffirms the fact that science is part and parcel of everyday life and cannot be divorced from it. Newspapers and magazines provide a unique advantage in maintaining this relationship.

3.2. Question 2: Describe any three activities that you found interesting in the newspaper/magazine, and explain how it is linked to science concepts that you learned in class.

Diverse activities were identified. Examples include identifying the generation and applications of static electricity, friction for an object in motion in a fluid, torques and beams in the newly built buildings. Some students also noted that the newspaper also presented them with unique opportunities and challenges, particularly on things that they learned in class and those they had not known before. The link between concepts in different subjects also featured in the reflections, such as issues cutting across physics and environmental science. One respondent reflected: *“Site seeing at state parks. They have an abundance of minerals for everyday use of the different kind of elements of the period table we have learned about. The opera house, the historical value is based on the architect from the past that involved physics for sound travel.”* Other observations reported were the relationship between different materials and energy, pollution and its impact on the environment, and recycling materials. On the structure of materials and concepts learned in class, one respondent quipped: *“Look at objects around you and figure out what they are made of, which elements you think compose each item. Find recyclables and think about the impact on the environment and renewable energies. Visit a creek or river and look at how the erosive power of water effects [sic] (affects) the surrounding area”.*

Based on the topic covered in class about an element Lead, one student noted the hazards presented by this element: *“People can know the main reason why the Peabody Opera House was closed, because of issues*

with asbestos-containing material, lead-based paint [sic] (paint), and miscellaneous hazardous materials. As in class, I learnt that lead is a naturally occurring metal that was once commonly used in gasoline.” This student noted that the knowledge from the physics class was helpful to prevent people from the dangerous effects of lead-based materials. Another interesting application of physics discussed include Newton's First Law and the concept of inertia as applied to cycling: “People are able to realize that when they cycle, they will have the tendency to keep on moving and thus, can cause them to fall down. But with this article that is posted in the magazine, people are able to overcome that because they can be informed about a training and practicing spot for them to ride their bikes.”

All these observations point to yet another key issue of concern in education, that of “*Applied Learning*”. As noted earlier, there is a tendency to look at “classroom learning” as a separate entity with a life and dynamic of its own, detached from the rest of life. Yet, “*carrying the classroom*” everywhere we go in our lives, enables us to envision that classroom knowledge is derived, driven and, thus, determined or influenced, by everyday events. It is what we encounter in life that leads us to seeking explanations to our experiences. Science is no more than an attempt to account for (explain) what we experience in real life. Science is a mere product of, or a response to, ordinary life events. We create science so that we can “apply” it to the understanding of our surroundings and, as a result of that understanding, to help us solve practical problems.

Unfortunately, the general tendency is for humans to create objects, but yet allow those same objects to act upon and control them (humans) as if they (objects) have a dynamic “life” of (and on) their own, a phenomenon referred to in sociology as “*reification*”. For example, we make laws but we turn around and allow those laws to control us as if they are infallible. We created computers and computer technology, but we now look at the computer to tell us what or what not to do, even as we elementarily know that the computer’s “intelligence” is no more than fallible human ingenuity that could be rescinded by any circumstances. Failure of the computer can literally bring life to a standstill. A case in point is all the hype that came with the (otherwise aborted) apocalyptic prediction that at the turn of the century on January 1, 2000, computers would fail to recognize the numerical change from 1900 to 2000 and everything connected to modern technology would “crash” and literally spell the end of the “human” world (except for the handful of the very technologically removed communities). This is the infamous “*Y-2-K*” (“*Year-2000*”) prediction as it came to be popularly known. This is science at the core of our everyday lives. In the modern world, we are at the mercy of science and awareness of the role of science in our daily lives is essential to everyone, and magazines and newspapers are the right forum more than the textbooks, since the former can reach almost anyone who chooses to pick up and look at a magazine/newspaper. Unlike a science (or any other) class, there is almost no cost to the knowledge, no pre-requisites, no grade, only that you must be able to read, and if not, to have someone to read to you!!

3.3. *Question 3: What skills/competencies did this newspaper or magazine article develop in your understanding of science?*

Major competencies comprise gaining knowledge about the real and everyday application of science concepts, and its use in explaining how real world physical phenomena relate to the class material. Reading some sections of the magazine helped the students to acquire a broad knowledge of various different topics that may not be covered in class. One disappointment noted by students was that the articles were not in the order similar to the way the material is presented in class or textbook. However, the same students still believe that pictures and illustrations helped them to gain an understanding of elements in real life and not just the simple concepts of science. For example, one student stated: “*people can be informed that substances that contain lead are dangerous and hazardous to them, thus they will have to stay away from it.*” This observation could not be any timelier, given that national disaster that recently took place in Flint, Michigan where the entire water system was completely affected by Lead poisoning. Yet, it took Science to figure out this problem and it will take Science to resolve it.

3.4. *Question 4: What two sections of the local newspaper did you find most interesting and how the sections were linked to your knowledge of science?*

The science of climate, composition of rocks, acceleration changes when going over a hill, water cleanliness and purification methods, sources of water pollutants, were some of the topics identified in the magazine. On purification methods, reverse osmosis and distillation were identified. Littering and how it eventually affects the oceans was also discussed. One respondent stated that “*showing images of the ocean covered in litter or sea life effected by not disposing of trash properly*” was helpful in understanding the extent to which humans have impacted the environment negatively. Another issue to appear convincing to most students was that the magazine helped them to understand the importance of science in their daily lives. To this effect, one respondent stated that “*Some people who aren't fortunate will not even have the luxury to turn on a light in their homes*” if it were not because of science.

3.5. Question 5: Based on the newspaper articles that you chose, reflect on your experience(s) or lessons from derived from reading the news article.

While students were able to identify science-related material in the magazine, they noted their joy in reading some other non-scientific sections of the magazine. Articles that mostly featured in several reflections were information on park sites, corporate retreats, special events, weddings, hiking trails, historic sites. Scientific knowledge gained through reading magazines was mostly on the applications of science concepts in many aspects of everyday life. One respondent stated succinctly: *“This has taught me that science can be found in basically everything in the real world. I can use this information to show someone that they come in contact with science every day. And being able to find examples of what was covered in class material shows signs of a truly educated person.”* In addition, the magazine provided a unique learning experience as one student stated: *“Being able to learn different subjects in science hands on gives the students a more efficient and effective understanding of topics throughout the class.”* The magazine provided unique opportunities to link class material to articles in the magazine.

4. Discussion

Overall, student reflections from this study indicated that incorporating newspapers or magazines in an introductory science course generates enthusiasm and motivation for learning. One of the reasons was that students were able to make a connection between concepts learned in class and articles in the magazine. These results are consistent with reports from other studies (Oliveras et al., 2011), which found that improvised material added critical thinking, creativity and confidence in teaching practical lessons. Students were able to identify the challenge to stretch their thinking beyond the classroom material which, in fact, is one of the major objectives of improvisation. The link between real life examples presented in the magazines and scientific concepts learned in class featured as an important factor as well.

All of this is consonant with the idea referred to earlier as “carrying the classroom” with you wherever you go. Students begin to fully understand the importance and relevance of the knowledge they acquire and how they can use it to make a real difference in people’s real life situations. They begin to realize that beyond earning a grade for themselves, they are part of something real and bigger and are being prepared for, some day, to possibly save someone’s life; and that, *that* “someone’s life” could be their own life or that of someone they care about. Unfortunately, no matter what subject we may focus on, classroom experiences (including “lab”, or “practicals” as they are known in some other societies) tend to be removed from the actual world of practicality. To use an analogy: in wartime it is better to (maskingly) use terms like “collateral damage”. To the ordinary ear, those are just common and normal “words”. It is “secondary” damage that we can (albeit regretfully) afford!! Yet those “mere words” are loaded with real life consequences that do affect real people’s lives and their generations to come. “Collateral damage” (or, in reality, “secondary” damage) refers specifically to “civilian casualties”, a reference (“casualties”) that still masks the true meaning of the situation. Regrettably, in either case, the words “damage” and “casualties” refer to DEATH (of actual, innocent, human beings).

This is where knowledge outside of the classroom becomes crucial. It is one thing to memorize concepts and to grasp complex formulas; it is one thing to conduct experiments in a Physics, Chemistry or Biology laboratory; yet it is another to see these things at work in real life action. There are many other examples that can be considered: it is one thing to learn and practice anatomy and physiology from a piece of plastic or from a “cadaver”; It is another to perform surgery on a real living person. It is one thing to discuss pollution in a classroom, and it is another to actually see the consequences of pollution. It is one thing to study the chemical properties of polyethylene (C₂H₄), especially the fact that it is not biodegradable, it is another to learn about its actual consequences on the “environment”; to see how oceans, lakes, rivers and seas are choking on “C₂H₄” and killing marine life. Likewise, it is one thing to refer to the “environment” in general, almost robotic terms, it is another to read about or see images of the consequences of the nuclear disaster in Chernobyl, Ukraine in 1986; the Exxon and Shell BP Oil spills in 1993 and 2010, respectively. It is one thing to discuss radioactivity in the classroom or to learn about nuclear fission or fusion from a computer model, it is another to read about well-documented effects (and potential effects) of nuclear technology. On the other hand, it is one thing to enjoy all the wonderful luxuries and necessities that we take for granted in everyday life, it is another to take time to see how we are surrounded by science in almost every life encounter we enjoy in our modern life.

In all the above illustrations, one common theme is that it is one thing to deal with issues in an artificial (including a scientific, laboratory) environment than in the real environment. By its very nature, most “science” as we know it, is based on “experiment” and, by the very nature of the term “experiment”, the presumed implication is that of “trial and error”, until “you get it right”!! Yet, even after “getting it right” scientific results are still an “approximation” of real life to some (arbitrary) ideal standard and not an absolute representation of it. Students need to be reminded that science mimics reality, and not vice versa. Science represents “tendencies”, majorities, patterns but (almost) never absolutes. Even “laws of nature” are always conditional. For example, both the Charles’ and Boyle’s “Laws” of gaseous behavior are based on the conditions of what is (conveniently

and arbitrarily) referred to as “normal” (“standard”) conditions of temperature and pressure.

The use of magazines as supplementary material also helps to remind students about the importance of “science” and “non-science” subjects, that is, all students need to be exposed to other fields because science does not exist in a social vacuum. Science is not necessarily neutral, but is subject to people’s interpretations, wishes and desires. It is affected by many things such as ideology, religion, politics, economics, etc. For example, if those in charge of government or whatever funding agent, do not believe in “global warming”, then there will be no grants for research in that area. Likewise, when a 5-year old child talks back to his/her parents, we can either just look at the child as just “being 5”, or we can diagnose him/her with “Opposition, Defiant Disorder” (ODD), which essentially means that the child has a “mental illness”. Thus, science as a set of natural processes, can be neutral. However, as humans are involved, interpretation of scientific events becomes contestable, based on human perception, interpretation and vested interest, or lack, thereof. That is how science is essentially guided by culture. In other cultures, for example, where talking back by a 5-year old is nothing so strange, there is no need to spend resources researching a “talking-back syndrome” (so to speak).

At another level, reflections show that most students thought newspapers were credible and a good source of new information on technological advances, and that they could be a good learning resource for rural communities. The diversity in articles spanning scientific and non-scientific issues was a good panacea for student boredom reduction. This was further corroborated by some reflections in which students indicated that the magazine also helped them to know about other social events, recreation areas, and other available important services, things that cannot be found in conventional science textbooks.

This is significant in several ways. First, once students find out that magazines contain “interesting stuff”, chances are they will be drawn to developing an interest in reading magazines and newspapers more often. The more they read the magazines and newspapers, the more they are likely to encounter stories and articles that interest them. This is likely to set on a “domino effect” of continued interest in reading magazines/newspapers. In this study, the aim was to examine articles that related to scientific material. Based on some of the responses, it is clear that while the students read the assigned articles, their eyes could not help but wander around and in the process they landed on other articles that they found useful and interesting. We shall call this the “proximity inevitability”. In essence, students become interested in looking at magazines as a way of finding “interesting stuff”. As they do so, however, chances are they will also look for, or accidentally land on, science-related articles. Thus, while the primary aim for consulting the magazines may not have been to search for scientific articles, as they look at the magazines for “fun stuff” they “might as well” look at the scientific articles (even as a secondary, incidental priority). To use an analogy of fishing, if you take a trip to go fishing for catfish as your primary goal but in the process you find that Bass fish are also available in the area and “biting”, chances are you will take the Bass fish, even though you would not have made a special trip to fish for Bass.

Finally, while students showed a great deal of interest in the use of improvised print media, there is still need for instructor guidance and ingenuity. For example, some students noted that articles were haphazard, with no sequential order of difficulty as presented in most science textbooks. This variability of articles also makes it difficult to perfectly mesh them with class content (Mysliwiec et al., 2003). That means that some students need instructor assistance to use these newspapers as supplementary learning material. To other students, the disorder gave them a positive and unique learning experience, contrary to the text style. It is not quite clear why this would be so, but in this generation where kids find most routine things to be “boring”, it might just be that if something was different from a routinely organized (“boring and dry”) text-book, anything else is inevitably more interesting. However, this is mere conjecture and nothing in the responses offers a clue. Another observation was that while students were able to visualize some concepts since they were presented in a journalistic style, they had problems with understanding more advanced concepts. For example, students were able to discuss concepts such as motion involving cycling, but could not go deeper into what causes the cyclists to balance only when the bicycle was in motion, an explanation that would require the slightly advanced knowledge of angular momentum. Such articles require instructor scaffolding and follow-up strategies aimed at nurturing students’ enthusiasm and correct assimilation of scientific concepts.

5. Conclusion

Student reflections in this study indicated that the use of magazines can help to transform the way science or any other class content can be taught. The findings indicate that students can be motivated to participate in science activities by using articles from the media as supplementary instructional material. The diversity of issues in these papers also appealed well to students, and they were able to link material learned in class to the articles in the magazine. On the other hand, critical analysis of student reflections also underscored the need for guided inquiry and scaffolding when using improvisational material as teaching tools.

At a broader level, while this study focused on introductory courses in the natural sciences, from a Liberal Arts and Sciences point of view, the same concern is valid with regard to all other subjects. The issue is even more significant if we bear in mind the obvious lack of interest in a rounded (LAS) education, among many

students. Students who consider themselves as being in the natural sciences do not seem to see the relevance of other subjects in their lives. It is as if Sociology affects only sociologists; Political Science, only Political scientists, Economics, only economists, etc. Likewise, students outside of the natural sciences seem to see natural science subjects as the concern and exclusive realm of those in those fields.

Thus, the need for an overall, rounded education remains a real one, regardless of disciplinary specialty. Yet, this is not to suggest that “traditional” forms of teaching have become obsolete. This is not an indictment of, or suggestion that, traditional instructional and pedagogical approaches have failed or are inadequate, but rather a response to changing circumstances. As indicated earlier, the nature of social institutions (government, education, health, family, justice system, etc.) and how they operate, is determined by other wider forces in society. The way institutions function is a response to wider forces and events, both physical and social, present or past. Therefore, given that the physical and social worlds are both dynamic and not static, we must adjust the way we operate in order to meet these changing circumstances. Education and learning are no exceptions to this need. In other words, it is imperative that we come to grips with the realization that times have changed and that new technology has ushered in a new form of “culture” which requires modifying, subsidizing, improvising or using any other mechanism or combination of mechanisms to assist existing instructional and pedagogical approaches. As such, different situations will require different forms of improvisation and there will not be one approach that will address all issues.

On a final note, therefore, the results of this study may not necessarily be generalizable to all science courses or to the type and use of newspapers or magazines. As a precautionary note, for example, this particular study used a non-political/non-partisan and non-religious magazine. Different magazines and newspapers can have their own ideological, political or religious leanings which could affect the level of interest in, and nature of interpretation of the material. Furthermore, while newspapers and magazines offer great opportunities to enhance student learning and persistence, researchers have pointed out the need to guide students on how to use these resources. Major concerns include the ability of students to decipher relevant information from lengthy articles; matching the content of the material with the level of students; and student time management. Furthermore, occasionally, scientific information gets distorted or lost in the translation. Instructors need to verify with the original source of information. As a way of raising awareness of the need to use accurate information, for example, Veneu-lumb and Costa (2010) suggest assigning students to identify distortions in newspapers and magazines. Similarly, students could be asked to look for distortions, or search for accurate information on the Internet. Another problem with this approach is that its success is dependent on the level of the material and the students in the classroom. Nonetheless, in spite of these observations, this study provides an insight into what potential there is out there in terms of pedagogical improvisation that could assist in enhancing learning motivation and enthusiasm in a new world where education and learning have to compete with the limitless and constantly distracting, attention-capturing abundance of what appears to be more “exciting stuff” that currently clogs the internet.

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