Use of metaphors in science essay

Art & Culture, Symbolism

Abstract

A metaphor is a description of an object real or imagined using concepts that cannot be applied to the object in a conventional manner. The metaphor can be a word, an image, a figure of speech. The object that is being described is known as the source while the unconventional concepts are known as the target. The metaphor could be derived as a result of certain similarities between the source and the target. Each culture has its representation based on the cultural dimensions which provide a framework for organizing the knowledge within that culture. These dimensions are: time orientation, individualism versus collectivism, masculinity versus femininity, uncertainty avoidance and power distance. Metaphors enhance creativity in the learning of programming. This is through the strong images drawn through the metaphors. They are therefore a vital tool in triggering the students mind to think outside the box and begin to find ways to solve problems in software design and web based technology. In architecture, the use of the architectural designs, the application of metaphors is involved in three key aspects of the design. The first step involves the extraction of a variety of unrelated concepts from various domains, where relationships with the problem at hand are not always obvious. The use of metaphors also has its own disadvantages. It could be therefore be a hindrance to them understanding the real concepts that have been explained by the metaphors. This makes it necessary for the teacher to regularly talk to the students thus help them understand the concepts that have been presented by the use of metaphors. Metaphors rely heavily on cultural dimensions. Therefore metaphors that apply to users of computers in North America who

use web based learning material might not necessarily be applicable to users in Australia. This paper shall analyze the use of metaphors in teaching science, the benefits and the challenges experienced as a result of the use of metaphors.

1. 0 Introduction

A metaphor is a description of an object real or imagined using concepts that cannot be applied to the object in a conventional manner . The object that is being described is known as the source while the unconventional concepts are known as the target. The metaphor could be derived as a result of certain similarities between the source and the target. The metaphor can be a word, a figure of speech or an image. Given the similarities and the differences between the source and the target, the metaphor is not just considered as a representation of the source rather it is viewed as the source.

Metaphors shape the way we view and interpret certain statements (perceptions). For instances, psychologists at Stanford University in California have done studies which show that people exhibit varying responses to crime when it is presented to them as either a 'beast' or a 'virus' ravaging society. In the former case people are more likely to think of strong law enforcement, whereas in the latter attention diverts to simpler methods of solving crime for instance rehabilitation and identifying the root causes of crime.

There are different cultures with unique ways of representing mental images. Each culture has its representation based on the cultural dimensions which provide a framework for organizing the knowledge within that culture. These

dimensions according to research are: time orientation, individualism versus collectivism, masculinity versus femininity, uncertainty avoidance and power distance. These dimensions need to be considered in the development of technological tools such as the internet. Products that have been made for everyone around the word have to be localized for a specific market based on the cultural dimensions that define that market.

The localization process requires the use of various methods and tools. According to research, localization can e done through by paying attention to things like texts, local formats, images, colours and flow. It is in the expression of these aspects that people from a particular culture can begin to actively identify with a particular product. In simple terms, metaphors are a vehicle for bridging the gap between the local and global market.

2. 0 The benefits of the use of metaphors

In computer science education, there are several instances when the use of metaphors comes in handy in the class room set up. Metaphors can play various roles in different contexts and at different times. One of the applications of metaphors is in the context of technology. An explicit metaphor is a technique used in presenting software in a manner that takes advantage of users' past knowledge and experience with a particular facet in technology (for example, a " window" into a document).

An implicit metaphor is a tool that aids the designers to grasp users and their tasks; a link between the two groups to find out different and new aspects of the tasks; a source of novel ideas and inspiration. These metaphors come handy in the course of designing the software applications but are not represented in the final interface design. Considering a message system as a

railroad, in order to understand queuing is an example of an implicit metaphor.

Metaphors can be used when teaching beginners programming. Initially the concepts in programming are too abstract and complex for the beginner to grasp. It is therefore imperative to make it easier for the learner to conceptualize the process of programming. For instance a data base can be compared to a desk which has several drawers (columns). The relationship between the columns can be infinite hence can be described as harem. Another example of the use of metaphors is seen in the description of dynamic memory. The dynamic memory can be descried as a left luggage room which has several lockers (memory cells) and the memory addresses are locker keys. At the dawn of this century, two scientists introduced a new learning tool for learning object based programming. The tool is based on ' actors on a stage' . The objects are represented as actors while the classes are regarded as a stage. This idea draws a clear picture of the use of parallelism.

One of the tools that makes a web based teaching platform is the use of metaphors. The use of metaphors makes it easier for the student to interact and identify with the concepts which are often pedagogic and didactic. Through the use of metaphors, a student who would have found the material boring and incomprehensible can begin to understand the most difficult of concepts given the simplicity of the terms used and the ease with which they can relate with the metaphors. Research has shown that when in comes to metaphors in the educational set up, more is better. The metaphors enhance the students thinking about the concept that is being taught hence they

enable the student to have critical and analytical perspective about a concept.

Metaphors foster creativity in the learning of programming. They enable the student to not limit their thinking to the raw concepts being presented as factors that do not relate to real life events. They are therefore an important tool in triggering the students mind to think outside of the box and begin to find ways to solve problems in software design and web based technology. This is through the strong images drawn through the metaphors.

During the software development process, it is important for the programmer to have clear picture of the link that exists between the developer, the user and the interface. Understanding this relationship is vital since it enables him to come up with programmes that are allow for interaction with the user while still maintaining the function that they were meant to perform. This is made possible by the use of metaphors as illustrated in this example:

Prior to beginning the game (design), the moderator puts up a group of ten to twenty task cards, based on the basic tasks that have been identified from the task analysis. After that the participants can then evaluate the tasks by putting closely related tasks in one group or putting aside tasks that are not related to the others. High-level tasks--those with multiple subtasks—are further broken down into elemental tasks, and the new tasks are assigned onto blank task cards. The new task cards are then evaluated and grouped together along with the original cards. Task group names can be scribbled on the task cards, or the facilitator may write group names on a Task Board and mark related tasks through use of children's stick-ons (teddy bears, beach

balls, and so on.

After that the players " free associate" based on a familiar place or activity-metaphor for the problem domain. The moderator can come up with a specific metaphor, or the group can pick a metaphor from a list of " starter" metaphors. After the group has made up their mind on a metaphor, players go on to naming the components, characteristics, or activities relating to the metaphor. It is from that point onward that the team can go ahead and begin to execute the designing element based on the metaphors for the tasks which simplify the execution of the task which would otherwise seem complicated. This illustration has been successfully used in various set ups that are charged with the duty of developing software. The simplicity of the metaphors has resulted in the development of interactive software and also enhanced co-operation among the members of the teams.

A survey of American medical schools shows that only 15% of the medical schools offer courses on medical writing. This is in spite of the immense need to have relevant knowledge in medicine conveyed in writing. One of the major tools conveying complex medical processes is through the use of metaphors. Niehls Bohr the father of quantum physics asserts in his earlier writing that the nature of things is so complex that we can only use the language of poetry to simplify the description. This assertion is also shared by another physicist David Bohm. The emphasis on the need for the metaphors was so important that an art historian at the MIT once taught a full course on the same as away to ensure that scientists in all fields including medicine found ways to use metaphors in their scholarly endeavors.

Metaphors are not just an aid to reflection but also help free the designers mind from the limitations imposed by teething problem hence spurring him to explore alternatives that are not familiar. In architecture, the use of the architectural designs, the application of metaphors is involved in three key aspects of the design. The first step involves the extraction of a variety of unrelated concepts from various domains, where relationships with the problem at hand are not always obvious.

The second step is in the establishment of the close link between the metaphorical concept and the problem. Relationships that are of secondary importance are left. Only correspondences between the metaphorical source and the problem are put up. The last step involves the transfer and application of structural correspondences associated with the metaphor to the problem being solved, which at the end generally leads to a novel solution.

In the design practice of architecture, there are numerous examples that illustrate the relevance of metaphors. For instance, the term 'form follows function' - means that the external appearance of a building is a product of the building's internal use – was a major influence for the architects that are associated with the Modern Movement. One of the most outstanding illustrations of use of metaphors is seen in the design of the prairie houses by the renowned architect Frank Lloyd Wright which is characterized by simple volumes that augment each other and interlock with some level of freedom depending on the functional needs.

'Form follows function' was implemented by Wright in the design of a large number of works, such as the Fricke House, Robie House at Chicago, the Unity Temple, the William Martin House, the Oscar Balch House which are all found at the Oak Park . Mies van der Rohe is another renowned architect known for his application of metaphors. One of the most memorable metaphors 'less is more which ' refers to the engineering idea of reduction of architectural design to its minimal and basic nature is attributed to him. The application of metaphor in his work was attained through the reduction of spatial dimensions hence maintaining simple, functional designs with reduced well utilized spaces.

2. 0 Disadvantages of using metaphors in science and technology

The use of several metaphors can be confusing to beginners in programming. It could be therefore be a hindrance to them understanding the real concepts that have been explained by the metaphors. This makes it necessary for the teacher to regularly talk to the students thus help them understand the concepts that have been presented by the use of metaphors.

Metaphors rely heavily on cultural dimensions. Therefore metaphors that apply to users of computers in North America who use web based learning material might not necessarily be applicable to users in Australia or in New Zealand. For instance a North American mail box with a flag for incoming mail has different meanings in other cultures. This should therefore be taken into consideration by the web designer or the soft ware developer in order to come with applications that are relevant to users across different cultures.

The use of metaphors is also heavily reliant on the times. Some metaphors become irrelevant with time thus they might not necessarily make sense to the users in a different age and time. For instance the metaphors that were used in the pre-millennial era may not necessarily have found their way to the post millennial era. This means that the educators in computer science need to constantly be up to date with the language that their students can understand and relate to in accordance to their era.

For web based learning environments, the use of personal metaphors can be limiting to the learner given that their view differ from those of the person who has used the metaphor to explain a particular concept. It is therefore imperative to limit the use of personal metaphors to avoid limiting the understanding of the learner of a particular concept.

One of the most controversial uses of metaphors in computing is the use of the term master and slave in reference to the boot set up system where the user encounters the master-slave bios system. This has been regarded by some scholars as a derogatory term given the history of the African American as slaves. It has been viewed as an attribute that further enhances the notion that the white people are superior hence do not work just like the master in the computer hence the term " master." On the other hand, the executors for the " master'' are regarded as slave. Interviews conducted among the African American community show that these terms are not well received particularly with those who experienced discrimination. It therefore becomes a sensitive issue when using this terms in the description of computing systems.

The use of metaphors in technology also takes time for the individuals in the particular field of science to assimilate as part of the regular lingo. For instance the use of the terms master and slave began in the early 20th century when engineers required using terms that would be easy to relate to for the various machines that were being used at that time. They originated from the fact that the master pendulums did not do as much work as the executing arms which were responsible for doing a lot of the work hence aptly named " slaves". These terms took a while to be assimilated by non-technical experts.

With the use of metaphors in teaching about medicine, biology or architecture, there is a likelihood of committing a lot of errors. This is due to the undue attention that can be paid to the metaphor rather than on grasping the biological process, the design concept. This gives rise to errors that could prove to be costly later

3. 0 Conclusion

The powerful images evoked by metaphors make them a necessary part of science and technology. They enable innovators and designers to conceptualize the problem, to come up with easy to follow steps while maintaining the needs of the user of the product in mind. However the application of metaphors needs to be done cautiously. The context within which metaphors are applied should be considered based on the level of knowledge of the individual, the cultural dimensions and the race. There is therefore to constantly keep the use of metaphors in context and apply them

in moderation to avoid confusing new users of technological terms and also encourage familiarity with the concepts expressed by the metaphors.

References

Aubusson, P., & Ritchie, A. H. (2006). Metaphor and Analogy in Science Education. Hague: Springer.

Cameron, L. (2002). Metaphors in the learning of science: A discourse focus. British Educational Research Journal, 28(5), 637-674.

Darian, S. (2000). The role of figurative language in introductory science texts. International Journal of Applied Linguistics, 163 - 186.

Eugene Garfield Institute For Scientific Information. (1986, October 20). The Metaphor-Science Connection. Essay of an information Scientist, pp. 316-322.

Keranen, J. (2005). using metaphors in computer science Education-cross cultural aspects. Joensuu: University of Joensuu.

Koohang, A., & Harman, K. (2005). Open Source: A Metaphor for E-Learning. Informing Science Journal, 8, 74-85.

Liverronen, & Hellsten, I. (2002). The Role of Metaphors in Communicating Biodiversity. Science Communication, 45.

Thomas, G. P., & McRobbie, C. J. (2001). Using a Metaphor for Learning to Improve Students' Metacognition in the Chemistry Classroom. JOURNAL OF RESEARCH IN SCIENCE TEACHING, 38(2), 222- 259.

Wright, V. H., Sundberg, C. W., Yarbrough, S., Wilson, E., & Stallworth, B. J. (nd). Construction of Teaching Metaphors Through the Use of Technology. Electronic Journal for the Integration of Technology in Education, 2-20.