



Keywords

Education,
Ecology,
Large Classes,
Future of Ecology,
Funding

Received: September 11, 2014

Revised: October 05, 2014

Accepted: October 06, 2014

Review of the future of ecology education

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Citation

Emmanuel Teryila Tyokumbur. Review of the Future of Ecology Education. *International Journal of Modern Education Research*. Vol. 1, No. 4, 2014, pp. 94-97.

Abstract

This paper emphasizes the future of ecology education. It defines education as a process and procedure of imparting and acquiring of knowledge through teaching and learning, especially at a school or similar institution and environment. The paper asserts that a right to education has been recognized by some governments since at the global level, Article 13 of the United Nations' 1966 International Convention on Economic, Social and Cultural Rights recognizes the right of everyone to an education. Although education is compulsory in most places up to a certain age, attendance at school often isn't, and a minority of parents often choose home-schooling, e-learning or similar for their children. The history and current state of ecology education is reviewed. The paper concludes that the challenge of funding would continue to reverberate in educational circles as more support systems and endowments are sought and found.

1. Introduction

Education is the process and procedure of imparting and acquiring of knowledge through teaching and learning, especially at a school or similar institution (Encarta Dictionary, 2009). Education in its general sense is a form of learning in which the knowledge, skills, and habits of a group of people are transferred from one generation to the next through teaching, training, or research. Education frequently takes place under the guidance of others, but may also be autodidactic or self-taught (Dewey, 1944). Any experience that has a formative effect on the way one thinks, feels, or acts may be considered educational. Education is commonly divided into stages such as preschool, primary school, secondary school and then college, university or apprenticeship.

Right to education has been recognized by some governments. At the global level, Article 13 of the United Nations' 1966 International Covenant on Economic, Social and Cultural Rights recognizes the right of everyone to an education. Although education is compulsory in most places up to a certain age, attendance at school often isn't, and a minority of parents choose home-schooling, e-learning or similar for their children.

2. History of Education

Education in the earliest prehistoric times began as adults trained the young of their society in the knowledge and skills they would need to master and eventually pass on to others. In pre-literate societies, this was achieved orally and through imitation (Wikipedia, 2014). Oral tradition or story-telling continued from one generation to the next. When cultures began to extend their knowledge beyond skills that could be readily learned through imitation, formal education developed. Schools existed in Egypt at the time of the Middle Kingdom Plato founded the Academy in Athens, the first institution of higher learning in Europe (Encyclopaedia Britannica, 2002). The city of Alexandria in

Egypt, founded in 330 BCE, became the successor to Athens as the intellectual cradle of Ancient Greece. The mathematician Euclid and anatomist Herophilus constructed the great Library of Alexandria and translated the Hebrew Bible into Greek. European civilizations suffered a collapse of literacy and organization following the fall of Rome in AD 476 (Geoffrey, 2004).

In China, Confucius (551-479 BCE), of the State of Lu, was China's most influential ancient philosopher, whose educational outlook continues to influence the modern societies of China and her neighbors. He gathered followers and searched in vain for a ruler who would adopt his ideals for good governance, but his Analects were written down by followers and have continued to influence education in East Asia into the modern era. After the fall of the Roman Empire, the Catholic Church became the sole preserver of literate scholarship in Western Europe. The church established cathedral schools in the Early Middle Ages as centres of advanced education. Some ultimately evolved into medieval universities and forebears of many of Europe's modern universities. During the High Middle Ages, Chartres Cathedral operated the famous and influential Chartres Cathedral School. The medieval universities of Western Christendom were well-integrated across all of Western Europe, encouraged freedom of enquiry and produced a great variety of fine scholars and natural philosophers, including Thomas Aquinas of the University of Naples, Robert Grosseteste of the University of Oxford, an early expositor of a systematic method of scientific experimentation; and Saint Albert the Great, a pioneer of biological field research (St Albertus Magnus, 1907; Robert, 1910). The University of Bologna is considered the oldest continually operating university. Elsewhere during the Middle Ages, Islamic science and mathematics flourished under the Islamic caliphate established across the Middle East, extending from the Iberian Peninsula in the west to the Indus in the east and to the Almoravid Dynasty and Mali Empire in the south (Wikipedia, 2014).

The Renaissance in Europe ushered in a new age of scientific and intellectual inquiry. Around 1450, Johannes Gutenberg developed a printing press, which allowed works of literature to spread more quickly. The European Age of Empires saw European ideas of education in philosophy, religion, arts and sciences spread out across the globe. Missionaries and scholars also brought back new ideas from other civilisations — as with the Jesuit China missions who played a significant role in the transmission of knowledge, science, and culture between China and Europe, translating works from Europe like Euclid's *Elements* for Chinese scholars and the thoughts of Confucius for European audiences. The Enlightenment saw the emergence of a more secular educational outlook in Europe (Wikipedia, 2014).

In most countries today, education is compulsory and free for all children to a certain age. Due to this the proliferation of compulsory and free education combined with population growth, UNESCO has calculated that in the next 30 years

more people will receive formal education than in all of human history.

3. Teaching of Large Classes

The Department of Education's 2005 report on Condition of Education asserts that school enrollments in colleges and universities will continue to increase at a steady rate. Hence, class sizes are reaching unprecedented high population levels. As a result, institutions of higher education are pushing their faculty to cope with the new situation and to deliver higher levels in quality and value in teaching (Carpenter, 2006). Outcomes of quality and value to a large class presents familiar challenges. Hence, it is crucial for teachers to identify viable methods of instruction for large classes. The primary purpose of this review is to identify effective teaching methods for especially large ecology classes and similar environments. Additional review questions include: Which teaching methods are effective for large class environments? What are the objective student rating of these teaching methods?

Efficient management of large classes is a popular topic among teachers in higher education. Several authors have produced books that focus large class environments, offering strategies for course design, student engagement, active learning, and assessment. However, the advantages of large classes include decreased costs of remuneration through hiring, efficient use of teacher's time, availability of resources, talent and standardization of the learning experience (McLeod, 1998). There are significant disadvantages though in large classes that includes strained interpersonal relations between the students and the lecturer due to stress, limitations in range of teaching methods, discomfort among lecturers teaching large classes, and a perception that lecturers who teach large classes are of derogatory status at the institution. Several extant researches on the relationship between class size and student performance has identified conflicting results (Toth and Montagna, 2002). While the results of some studies show no significant relationship between class size and student performance (Hancock, 1996), others favor small class environments (Borden and Burton, 1999; Arias and Walker, 2004). The results vary based on the criteria used to assess student performance, as well as the class size measure in itself. However, when traditional achievement tests are used, small classes provide no advantage over large classes (Kennedy and Siegfried, 1997). On the other hand, if additional performance criteria are used such as long-term retention, problem-solving skills, it appears that small classes hold an advantage (Arias and Walker, 2004).

Traditional passive view of learning involves situations where material is delivered to students using a lecture-based format. In contrast, a more modern view of learning is constructivism, where students are expected to be active and participate in the learning process by participating in discussion and collaborative activities. Overall, the results of

recent studies concerning the effectiveness of teaching methods favor constructivism, active learning methods. The findings of a study by de Caprariis *et al*, (2001) assert that lecture leads to the ability to recall facts, but discussion produces a higher level of comprehension. Furthermore, research on group-oriented discussion methods has shown that team learning and student-led discussions not only produce favorable student performance outcomes, but also foster greater participation, confidence and leadership skills (Yoder and Hochevar, 2005). Other researchers who examined student performance in team learning methods, found positive learning outcomes as compared to traditional lecture-based methods. In contrast, Barnes and Blevins (2003) suggest that active, discussion-based methods are inferior to the traditional lecture-based method. Comparatively, lecture combined with discussion and active, cooperative learning method shows that the use of the lecture combined with discussion resulted in superior retention of material among students. In terms of students' preferences for teaching methods, Qualters (2001) suggests that students do not favor active learning methods because of the in-class time taken by the activities, fear of not covering all of the material in the course, and anxiety about changing from traditional classroom expectations to the active structure. On the contrary, Casado (2000) studied perceptions across six teaching methods: lecture or discussion, lab work, in-class exercises, guest speakers, applied projects, and oral presentations which showed that students preferred the lecture/discussion method. Others favorably accepted and regarded were Lab work, oral presentation, and applied projects. Hunt *et al* (2003) also concluded about favorable student attitudes towards active learning methods.

4. The Current State of Ecology Education

Education and learning at its current state has emphasis placed on andragogy, pedagogy and distance learning. Andragogy are teaching strategies developed for adult learners or adult education. Knowles *et al* (2005) described andragogy as the art and science to teach adults to learn. It is often interpreted as the process of engaging adult learners with the structure of learning experience. The term 'andragogy' has been used in different times and countries with various connotations. Nowadays there exist three main understandings namely:

1. In many countries there is a growing conception of 'andragogy' as the scholarly approach to the learning of adults. In this connotation, andragogy is the science of understanding, i.e. theory, and supporting lifelong and life wide education of adults.

2. Especially in the USA, 'andragogy' in the tradition of Malcolm Knowles, labels a specific theoretical and practical approach, based on a humanistic conception of self-directed and autonomous learners and teachers as facilitators of learning.

3. Widely, an unclear use of andragogy can be found, with its meaning changing (even in the same publication) from 'adult education practice' or 'desirable values' or 'specific teaching methods,' to 'reflections' or 'academic discipline' and/or 'opposite to childish pedagogy', claiming to be 'something better' than just 'Adult Education'.

Knowles himself changed his position on whether andragogy really applied only to adults and came to believe that pedagogy-andragogy represents a continuum ranging from teacher-directed to student-directed learning and that both approaches are appropriate with children and adults, depending on the situation (Wikipedia, 2014).

Pedagogy is the science or profession of teaching. For teaching to be effective, one has to have a philosophy of teaching. This includes but is not limited to outlook on the field of study, time management in interacting with students and solving their problems, realizing the challenges inherent in the subject and how to overcome them as well as foresight into the future and recent developments amongst others. There is fulfilment and joy in teaching as sharpens one's consciousness of the subject matter and its recent advances for the new generation of adults.

Distance learning is education for students working at home, with little or no face-to-face contact with teachers and with material provided remotely or virtually, e.g. by e-mail, internet, radio, television, or correspondence. It gives opportunity to the work class or those who have sufficient reason not to be on a campus to attain their educational goals and aspirations. Distance learning has evolved and still continues to advance today with emerging technologies for virtual learning and student sophistication in the knowledge acquisition domain. My contribution would be to teach, do research, supervise students and carry out community service in my work place.

5. The Future of Ecology Education

The future of ecology education is strategically positioned for reforms at all educational levels, with a particular focus on how well colleges and universities are preparing students for the 21st-century workplace, as well as a secondary focus on how well high schools are preparing the students for post-secondary education. The main focal key areas: access, affordability (particularly for non-traditional students), the standards of quality in instruction, and the accountability of institutions to their constituencies (students, families, taxpayers, and other investors in education). With the advent of social media and technological advancements, learning is poised to be made easier, affordable and accessible. Online mentoring would therefore feature prominently in developing young adults to be responsible in the web content they view and post online. The general fear in educational circles recently and in the future would be that the seemingly deteriorating education system is waning and failing to prepare the workforce for the rigors and competitiveness of the globalized marketplace right from the preschool through higher education. Lecturers teaching large classes should be

adequately compensated based on minimum required.

The challenge of funding would continue to reverberate in educational circles as more support systems and endowments are sought and found.

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