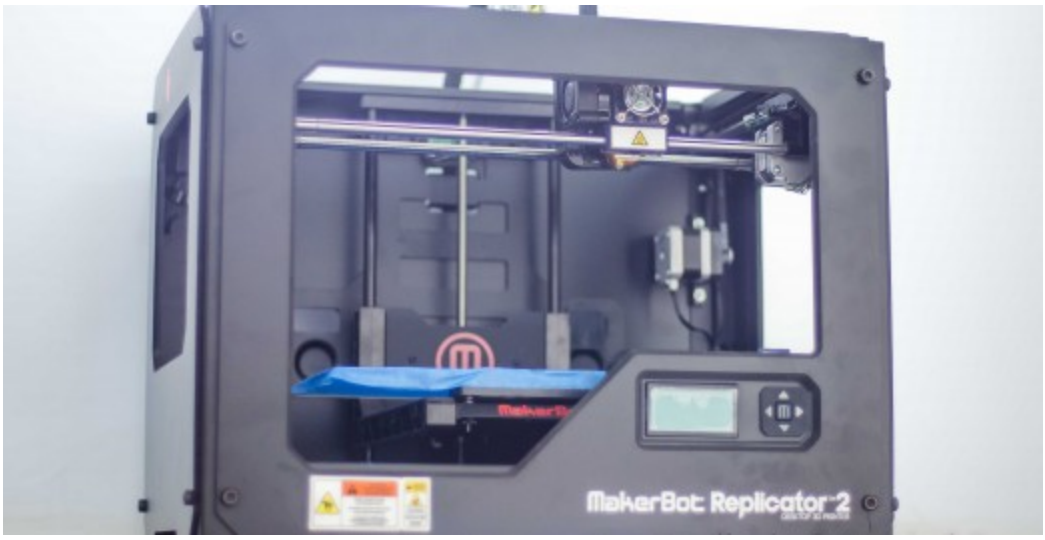

MakerBot Replicator2,the kind that is found at C4DLab, is a type of a three dimensional(3D) printer.What it does can only be estimated.

As virtually everything is bound to be 3D printed and very useful for human beings, the discovery is the future of the developing world .And before we go any far, it is not far-fetched to claim that those who discovered 3D printing had the affairs of the developing world at heart.

History of 3 Dimensional Printing

Here is its brief history :According to Wikipedia, 3D printing or additive manufacturing (AM) is “any of various processes of making a three-dimensional object from a 3D model or other electronic data source primarily through additive processes in which successive layers of material are laid down under computer control. A 3D printer is a type of industrial robot.”

Early Additive Manufacturing equipment and materials were developed in the 1980s. They were expensive and most required special handling. And the names ‘3D printing’ and ‘additive manufacturing’ did not yet have currency as umbrella terms for the field as each AM technology went by its own name.

In 1984, Chuck Hull of 3D Systems Corp invented a process known as stereo-lithography (STL). It functioned with Ultra-Violet lasers to cure photopolymers. Hull also developed the STL file format widely accepted by 3D printing software, as well as the digital slicing and infill strategies common to many processes today. Also, during the 1980s, the metal-sintering forms of AM were being developed (such as selective laser sintering and direct metal laser sintering)-although they were not yet called 3D printing or AM at the time.

In the 1990s, the ‘plastic extrusion technology’ -most widely associated with the term ‘3D printing’- was commercialized by Stratasys. In this process, what we know today as 3D printing came to be known as fused deposition modeling (FDM).

An article in the February 2011 issue of the Economist observes that “3D printing technology, which found applications starting in the 1980s in product development data visualization, rapid prototyping, and specialized manufacturing, has been under development in the decades since.”

Therefore, if 3D printing is allowed to thrive in the developing world at an alarming rate (with its many novel applications) then it means just one thing: the future of the developing world is sparkling bright. In other words, whatever use 3D printing may be put into, it will benefit the so-called third-world a great deal.

Rapid Prototyping

The application of 3D printing in rapid prototyping as well as manufacturing offers a significant opportunity for countries in the developing world to solve the problem of homelessness once and for all. Using proprietary powdered metals, casting media (such as sand), plastics, paper or cartridges, a house can be constructed in the shortest time possible and least expensively with a special type of 3D printer. The result in this case is that incidences of homelessness or slum- dwelling will decline significantly in the developing world.

3D printing will accomplish all this because advances in Rapid Prototyping (RP) technology have introduced materials that are appropriate for final manufacture, which has in turn introduced the possibility of directly manufacturing finished components.

One advantage of 3D printing for rapid manufacturing lies in the relatively inexpensive production of small numbers of parts. Further, Rapid Manufacturing-identified as a “next level” technology from many quarters-incorporates selective laser sintering (SLS), or direct metal laser sintering (DMLS).The foregoing are some of the better-established rapid prototyping methods.

Mass Production

Secondly, by looking at how modern 3D printers work, one must conclude that Additive Manufacturing is indeed a Mass production invention. Compared to earlier printers, whose slow print speed limited their use for mass production, the current ones come with ‘fused filament machines’ and multiple ‘extruder heads’. These can be used to print in multiple colors, with different polymers, or to make multiple prints simultaneously. This increases their overall print speed during multiple instance production, while requiring less capital cost than duplicate machines-since they can share a single controller.

The print speed increases proportionately to the number of heads. Furthermore, the energy cost is reduced due to the fact that they share the same heated print volume. Together, these two features reduce overhead costs.

Therefore, for the developing world, mass production means big business. Big business means big money and mass employment; big money in turn means considerable decline of the ever-present plague of poverty, which in third world countries is deemed to be the root of all evils.

Economic Empowerment

Three Dimensional Printing is bound to give everyone in the developing world the power to mass-produce or just produce virtually anything for their own good. AS this new mode is expected to captivate hobbyists and enthusiasts, anything is possible. They will use it for practical household applications such as door knobs, back-scratchers, clocks, coat-hooks, and so on. Households can also use 3D printing to manufacture ornamental objects like necklaces, rings, etc.

Other things that can be produced by 3-D printing in the third world include clothing: 3D printing is being used in the advanced world for designing bikinis, shoes, and dresses. It is also important to mention that this technology can also be used for printing consumer grade eye-wear with on-demand

custom fit and styling (although they cannot print the lenses). The on-demand customization market for glasses is something that has been deemed possible with rapid prototyping.

Revolution in Medicine and Healthcare

Additive Manufacturing has another potential: to revolutionize medicine and health-care in these countries. One of the biggest problems that have been undermining the developing world is disease, majorly worsened by ineffective or backward medicinal as well as technological practices. However, 3D printing is here to their aid.

As things stand right now, Biotechnology firms and academia are researching and testing if 3D Bio-printing (organ printing, body part printing or computer-aided tissue engineering) can effectively be used in tissue engineering applications, in which organs and body parts are built using inkjet techniques. In this process, layers of living cells are deposited onto a gel medium or sugar matrix and slowly built up to form three-dimensional structures including vascular systems.

Along these lines, the first production system for 3D tissue printing was reported to have been delivered in 2009.It was based on NovoGenbioprinting technology. Later on, an early-stage of a medical laboratory and research company (Organovo) designed and developed functional, three dimensional human tissue for medical research and therapeutic applications.

In 2014, researchers successfully implanted a 3D printed skull component into a patient, without any adverse effects. This new finding gives the opportunity for new implants to be custom-tailored to the patient, in many different applications. This allows for new greater innovation when it comes to 3D printed implants.

However, those are not the only possibilities. There are many more. Just for instance, 3D printing can be used to print patient specific implant and device for medical use such as ‘prosthetics’ and the most crucial one: a skull. The hearing aid and dental industries are also expected to be the biggest area of future development using the custom 3D printing technology. 3D printers can also be used to help animals. For example, a 3D-printed foot can enable a crippled animal walk again.

In addition, since some 3D printers will have been developed for ‘general’ use, some will even be used to produce chemical compounds, initially without immediate application as proof of principle. Such printers are expected to print with anything that can be dispensed from a syringe as liquid or paste. The developers of the chemical application envisage that this technology could be used for both industrial and domestic use, including, for example, enabling users in remote locations to be able to produce their own medicine or household chemicals.

In summary, the above developments, for the developing world, herald healthy living, longevity as well as prosperity-hence the need for them to embrace 3D printing.

Revolution in Science and Technology

We can also examine the relationship between 3D printing and science education in third world countries. Science and technology are the key drivers of economic development in the developed world. Third world countries too need science and technology to advance and to improve the lives of its populace, but science has to be taught appropriately and completely. Hence with this technological innovation, it is expected that the teaching of science in these countries will go a notch higher.

In the developed world, 3D printing is essentially used by students to create prototypes of items without

the use of expensive tooling required in subtractive methods. Such Students design and produce actual models they can hold. The classroom environment allows students to learn and employ new applications for 3D printing. And it has been found that Students discover their capabilities with 3D printing.

Effects of 3D printing

Additive Manufacturing (3D printing) has innumerable positive effects on the affairs of the developing world. But the ones that will raise eyebrows are economic independence, improved healthcare as well as social status.

Precisely, advocates of 3D printing predict that this technological development will counter 'globalization', as end users will do much of their own manufacturing rather than engage in trade to buy products from other people and corporations.

3D printing could go a long way towards helping developing countries to conserve their ever-declining forest cover due to irresponsible logging. Just for instance, should furniture and many other household items be made out of plastic, few and few trees would end up being cut and many many more preserved for health and aesthetics. Hence the third world will have contributed a great deal towards addressing the adverse worldwide effects of climate change, such as global warming.

In the final analysis, if Additive Manufacturing(AM) is taken seriously by manufacturers as an alternative to cutting, bending, pressing and molding(which of course is detested by many, for it is even time-consuming and expensive),the developing world will 'get there' in terms of socio-economic transformation-in just a matter of time. It should therefore be embraced to help people in such countries improve their everyday lives.

QUICK-READ

The Potential of our MakerBot Replicator2 3D Printer

C4DLab is currently testing the capability of its three dimensional(3D) MakerBot printer.
Indeed,what has already been accomplished by our Maker Bot indicates that the possibilities are limitless. For instance, the 3D printing team has so far come up with a statue of a squirrel, banner holder, comb, phone cover and stand among other things.

Some of the items printed by the C4DLab's MakerBot.

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