

## **A Prototype Design Model for Modern Medical Cum Anatomy Museum in Any Medical Institution: Sharing Experiences from a Social Innovation Workshop—A Review Article**

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**Keywords:** medical education, social entrepreneur, medical schools, social accountability, accreditation

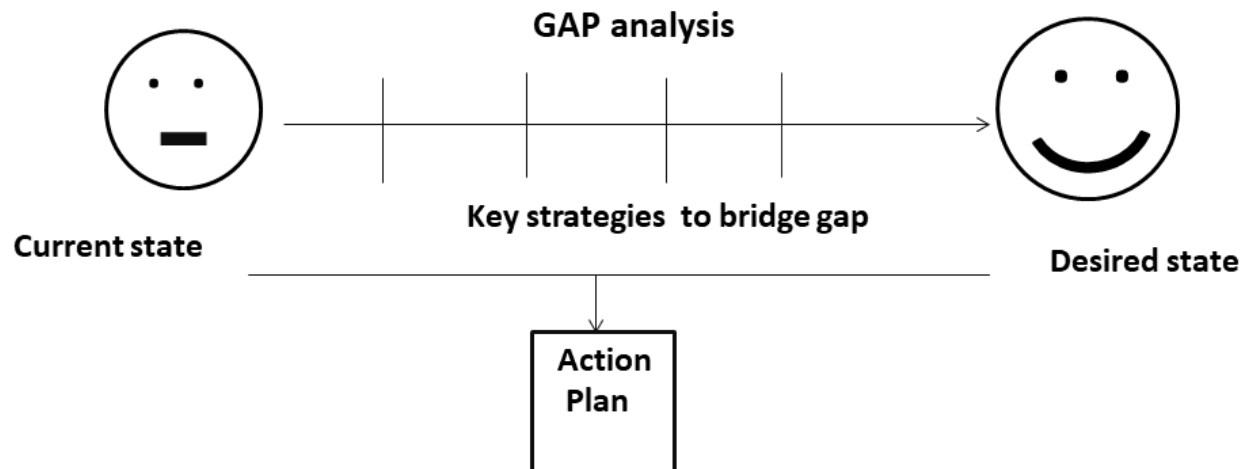
### **Abstract**

There is a need for a positive mindset for organizational development through innovation. Teaching-learning by sketching, virtual model, atlas, and plastic model are common methods in anatomy and skill-lab. Teaching-learning via real human organs or parts may enhance the better understanding of surgical skills, orientation, and relation of human body parts (1). Motivational factors for the idea of establishing a modern anatomy museum, the formulation, and exploration in this grey area were identified as; poor resources (tools) for learning purposes in medical schools; lack of knowledge of museum design may be a less cared area during education; 3D visualization of human body parts for school students, patients, public, allied and community health workers, medical UG/PG; scope to utilize their free time to gain knowledge; lots of scope for learning as well as skills gaining (required for skill lab in this competency based medical education curriculum) in medical institution; and matter of institutional pride to have a modern, well-furnished and well-designed anatomical museum of 21<sup>st</sup> century (2, 3). This can cause awareness among the people for a healthy society and the growth of all stakeholders too (4, 2).

### **Gap Analysis**

Gap analysis was required to compare the difference between the present situation and the desired future state, i.e., from actual performance to the potential target state, by bridging the gap with key steps (*Fig. 1*). There may be chances that the current medical fraternity could benefit from the medical cum anatomy museum. Due to the unavailability of cadaver dissection in medical schools, the platform for virtual learning is becoming increasingly popular with the trend of using plastic models alongside 3D printed models. There may be a knowledge gap in learning or understanding the actual relation of structures present in the human body to acquire the surgical knowledge, surgical skills, and other medical competencies gained during undergraduate and postgraduate education in medical fields. Only a few medical schools, however, have started considering the contents of the museums as irreplaceable resources for modern medicine and medical education purposes. The spaces they occupy offer a great environment for independent

and self-directed learning. Hence, medical schools have been updating medical museums with new technologies, such as audio-guided museum tours for learning, and a majority of these have been found clinically relevant. So, it would be wise to make a medical cum anatomy museum incorporated as a part of the medical training curriculum to enhance teaching and learning activities (5). The process was discussed and modified during various TUFH online sessions for a good prototype with the co-authors who presented the concept prototype.



*Fig. 1. Gap analysis process for our ecosystem*

Medical museums may be used as a tool for independent learning, as the trend of self-directed and independent learning is increasing in many medical schools. The unique environment of medical museums can be ideal for fulfilling those purposes, as the physical space of a medical museum can encourage small-group learning as students gather around particular exhibits for collective study. Studying in the medical museum environment can also protect students from social isolation (6).

Most museums have a huge collection of anatomic, pathologic, and forensic specimens preserved in formalin-based solution in glass jars. These specimens are usually fully labeled such that medical students can view and study them in a self-guided fashion along with surgical instruments. After the advancement in plastination technique for preserving anatomic structures, plastinated organs have considerably enriched the collections for a longer duration in medical museums for education and research purposes (7). The collection of specimens in anatomy museums may allow interested researchers to reinvestigate specimens, with contemporary techniques, including molecular and genetic techniques today, or even more advanced tools that may be developed in the future. These specimens can be utilized in correlating clinical aspects, gross anatomical morphology, and bones and anatomical variation research (8).

### **Innovation/Idea**

The innovation or the idea was to use the anatomy museum as a tool that would complement the current medical educational system. The concept of museums would supplement teaching-learning processes in anatomy, surgery, allied sciences, and for allied health workers to enhance their practical medical knowledge. The anatomic and pathologic specimen collections in museums are uniquely able to convey structural relationships in a real scene, which may not be replicated in any other means (9).

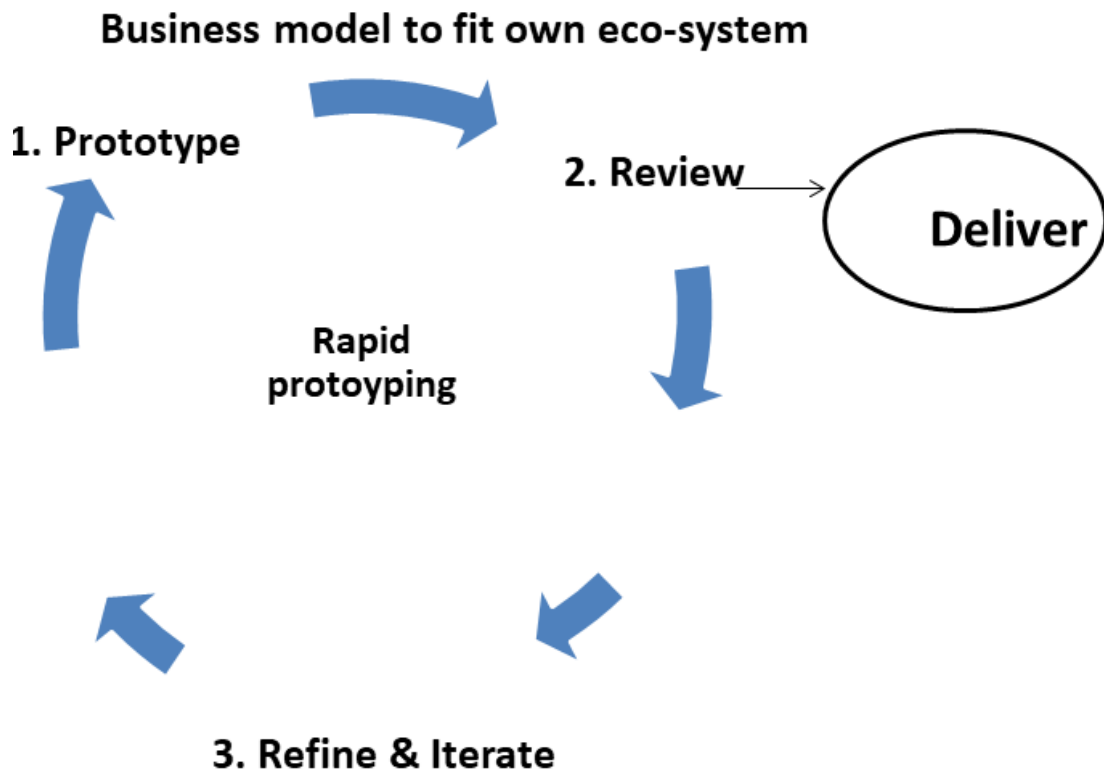
The use of prosected specimens in medical museums for self-directed learning and continuing medical education is found to be superior and more interesting than the use of multimedia and computer-based simulation training (10). Medical museums with a collection of decade-old instruments which has been in continuous evolution and modified during clinical and surgical procedures can be a great learning resource for medical students and junior residents in surgical specialties. Anatomic specimens can give a view of different surgical sites that medical personnel encounter in routine clinical schedules. With the cadavers in the museum, it could play an invaluable role in developing skills of accurate visual-spatial correlation during minimally invasive surgery, percutaneous, and endoscopic approaches. These procedures require that a surgeon have a strong practical knowledge of anatomy to approach through small incisions, which is beneficial to the patient during treatment and surgical procedures. Medical museums also aid in observational skills development in the medical education field. Observational skills are critical to the patient-physician relationship and constitute a cornerstone of a positive therapeutic outcome (11).

Many medical schools have adopted programs to improve students' observational skills through exposure to visual art, which includes programs as slides of artwork in a classroom (12), visiting museums, or drawing (13, 14). Students' observational skills in general can be better learned in a museum that provides a medical context to the learning in a real scenario. The small-group learning environment in anatomy museums can help promote interpersonal and communication skills to develop professionalism. Hence, though the advances in information technology have revolutionized medical education, the role of medical museums still exists, persisting to complement the current educational system in the healthcare education sector (12).

### **Business Model**

Rapid prototyping, reviewing, and refining are needed for its functional model to deliver a quality, measurable outcome via the anatomy museum and finally to fit into its own ecosystem (*Fig.2*). The national and institutional policies would be key factors to enhance its growth. For this long-term plan, it is required to build up knowledge sharing among the different stakeholders (e.g., faculties, institute, local government, policy makers, etc.), collaboration, and effective team building for long-term leadership and effectiveness of the idea of having a modern anatomy museum. This will help the strategies and ideas to be integrated.

For raising the capital to establish a proper financial model, the primary and secondary sources, internal and external funds, short-term, interim, and long-term sources need to be identified. They could be as Institutional funds, government seed (local or central government fund), or foreign aid to developing countries. The institution, the medical school itself, can use its own existing human resources to do the operational planning and day-to-day activities with no extra



financial burden.

*Fig. 2. Business model to fit the context ecosystem*

Business models need to be framed in an appropriate method, as medical museums still offer important benefits that should not be ignored and cannot be achieved by multimedia, virtual-mode learning, or virtual dissection. Lots of advantages of medical cum anatomy museums as tools in medical education still persist. Assumptions for getting launched from the existing museum are that it is a one-time investment for the concept.

### **Revenue Generating**

Revenue could be generated regularly through complementing the current medical education system through sources that can be categorized as charges via various criteria, e.g. life-long membership, temporary membership charges, single/ group visit charges, group visit charges to museum from the visitors in our ecosystem even involving the other medical institution nearby locality and gain sustainability for long term progress.

Scaling up with a time frame could be a challenging part to make this not very profitable model, but create a greater impact on a wider scale in the medical education field, sharing health awareness of human body parts and how they function (15, 16). Thus, the estimated startup capital could be minimal for furnishing, light, accessories, facilities for a learning environment, etc, to meet the goal of setting up in the present situation. The strategies required for this model to be executed are possible by integrated organizational systems and processes, leadership and management style, faculties, resources, common values between stakeholders, and organizational culture (17).

In conclusion, the government policy makers can be attracted to expand this program in different state/ province institutes to have a greater impact in the health and education fields. Its impact could be on patients, school-going children, community health workers, medical students (UG/PG), consultants, the general public, and society itself through mass awareness.

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