The Impact Of Science Museum On Education In Iranian Schools

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Abstract. *In this study, the effect of the Museum of Science on Iranian school education has been studied. Considering that each year, due to various reasons such as lack of time and space and laboratory facilities in Iranian schools, the process of conducting research and laboratory activities is weaker than before; in this article, the effect of science museum on education from the perspective of influence Personal impacts, social impacts, political impacts, and economic impacts. The findings show that the Science Museum can be effective in education.*

Key words: science museum, Iranian school, Personal impact, Economic impact, Social impacts, Political impacts, Education.

History of the Science Museum

The public museum as understood today is a collection of specimens and other objects of interest to the scholar, the man of science as well as the more casual visitor, arranged and displayed in accordance with the scientific method. In its original sense, the term 'museum' meant a spot dedicated to the muses - 'a place where man's mind could attain a mood of aloofness above everyday affairs.'"

As early as the Renaissance, many aristocrats collected curiosities for display to their friends. Universities and particularly medical schools also maintained study collections of specimens for their students. Such collections were the predecessors of modern natural history museums. The Utrecht University Museum, among others, still displays an extensive collection of 18th-century animal and human "rarities" in its original setting.

Another line in the genealogy of science museums came during the Industrial Revolution, with great national exhibits intended to show case the triumphs of both science and industry. For example, the Great Exhibition in The Crystal Palace (1851) eventually gave rise to London's Science Museum.

A science museum or a science centre is a museum devoted primarily to science. Older science museums tended to concentrate on static displays of objects related to natural history, paleontology, geology, industry and industrial machinery, etc. Modern trends in museology have broadened the range of subject matter and introduced many interactive exhibits. Many if not most modern science museums - which increasingly refer to themselves as 'science centers' or 'discovery centers' - also put much weight on technology.[1]

- The Science Museum in America

In America, various Natural History Societies established collections in the early 1800's, which evolved into museums. Notable was the early New England Museum of Natural History which opened in Boston in 1865.

[1] A. Shekarbaghani, *Design and development of mechanisms for creating museum and science and technology exhibitions in each of the country's cities*. *Full research reports,* Educational research Studies, Tehran, 2016.

The modern interactive science museum appears to have been pioneered by Munich's Deutsches Museum in the early 20th century. This museum had moving exhibits where visitors were encouraged to push buttons and work levers. The concept was taken to the U.S. by Julius Rosenwald, chairman of Sears, Roebuck and Company, who visited the Deutsches Museum with his young son in 11011. He was so-captivated by the experience that he decided to build a similar museum in home town of Chicago. The Chicago Museum of Science and Industry opened in phases between 11033 and 11050.

In the mid-twentieth century, Frank Oppenheimer included interactive science exhibits at San Francisco's Exploratorium. The Exploratorium made public the details of their own exhibits in published "Cookbooks" that served as an inspiration to other museums.

Opened in 11067, the Ontario Science Centre continued the trend of featuring interactive exhibits, instead of just static displays. Most science centers have emulated this since.

Four years after the Exploratorium opened, the first OMNIMAX theater opened as the Reuben H. Fleet Space Theater and Science Center in San Diego's Balboa Park. The tilted-dome Space Theater doubled as a planetarium. The Science Center was an Exploratorium-style museum included as a small part of the complex. This combination interactive science museum, planetarium and OMNIMAX Theater set the standard that many major science museums follow today.

As the flavor of interactivity crossed the Atlantic, the massive Cite des Sciences et de l'Industrie opened in Paris in 11086, and smaller but no less influential national canters soon followed in Spain, Finland and Denmark. In the UK, the first interactive centers also opened in 11086 on a modest scale, but the real blossoming of science centers was fuelled by Lottery funding for projects to celebrate the millennium[2].

The mission statements of science centers and modern museums vary. But all are united in being places that make science accessible and encourage the excitement of discovery. They are an integral and dynamic part of the learning environment, promoting exploration from the first 'Eureka!' moment to today's cutting edge research. [3]

• The Science Museum in London, United Kingdom

Universally known as just "The Science Museum." Unlike many other institutions referred to as science museums, the Science Museum is primarily a historical museum and not a demonstration exhibit (although it does contain such science centre installations as well). It includes such famous items as many of the

[2] T. H. Krakauer, *The North Carolina Museum of Life and Science: Economic Impact Analysis*, Durham, North Carolina, The North Carolina Museum of Life and Science, 2011, p. 1.

[3] .J. H Falk, L. D. Dierking, *Learning from Museums: Visitor Experiences and the making of Meaning*, Walnut Creek, AltaMira Press, 2000.

first steam engines, Stephenson's Rocket steam locomotive, the original models of DNA, the first MRI machine, the first jet engine, and more[4].

Iranian National Museum of Science and Technology (INMOST)

Iranian National Science and Technology Museum (INMOST) is the key historical, scientific and cultural project. INMOST is the national tourist spot of important science education and leisure travelling base.[5]

With the theme of "History of Science and Technology" demonstrated by modern digital and interactive methods, INMOST works for promoting scientific and cultural quality of the whole citizens and sharpening the comprehensive competitive edges of Iran.

Iranian National Science and Technology Museum currently has opened 6 thematic exhibition halls to the public. They are: Alternative Energy, Ancient Indigenous Technologies, Physics, Surgery and Astronomy Instrument, Communication and Science center.

The building, designed by French architect André Godard and completed in 1937, is one of the more attractive modern buildings in Tehran, blending Sassanian principles with art deco–style brickwork.

Goals

- Improve the public understanding of science and technology
- Shaping the future by preserving our heritage, discovering new knowledge, and sharing our
- resources with the world
- Encourage inquisitiveness and curiosity.
- Scientific communication with young inventors and those offering new ideas.

Values

- Discovery: Explore and bring to light new knowledge and ideas, and better ways of doing business
- Creativity: Instill our work with imagination and innovation
- Excellence: Deliver the highest-quality products and services in all endeavors
- Diversity: Capitalize on the richness inherent in differences
- Integrity: Carry out all our work with the greatest responsibility and accountability
- Service: Be of benefit to the public

The aims of the study

1. To collect reports and studies on the roles played by science centers in different communities.
2. To summarize and present these studies in a useful, accessible way.
3. To identify the impact of science centers on education.

[4] P. Greene, *Reinventing the science museum - The Museum of Science and Industry in Manchester and the regeneration of industrial landscapes. The European Museum Forum Annual Lecture 2001*, Gdansk, 2001.
[5] www.irstm.ir, accessed 12. 06. 2017.

The methods

I began by gathering existing reports of studies into the impact of science centers on their communities. To acquire these studies, I sent emails to science centers and museums in science center networks requesting copies of published and unpublished reports relating to the impact of their institutions on their surrounding communities. I also wrote to Iranian colleagues who had recently carried out research in science centers, asking them to recommend relevant articles on the impact of science centers. I also identified and listed a small number of key papers in the field that I considered particularly useful for the aims of the study.

The impact of science museums

The *impact* of a science museums or science center is defined as the effect or influence that a science center has on its community of interest.

The *community of interest* is the group of people and organizations that the science center considers to be its clients or potential clients[6].

The Personal impact of a science center is defined as the change that occurs in an individual as a result of his/her contact with a science center [7].It includes factors such as:

- Science learning
- Changed attitudes to science
- Social experience
- Career directions formed
- Increased professional expertise
- Personal enjoyment

The Societal impact of a science center is defined as the effect that a science center has on groups of people, organizations, and on the built and natural environment.[8] Examples of societal impact are:

- Local/regional/international tourism
- Community leisure activities
- Youth employment
- Community partnerships
- Volunteer schemes
- Local clubs and societies
- Urban redevelopment
- Environmental restoration

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[6].E. P .Persson, "Community Impact of Science Centers: Is there Any? Curator," in *The Museum Journal*, VIIL (2000), no. 1, p. 9-18.

[7]B . Piscitelli, D. Anderson "Young children's learning in museum settings", in *Visitor Studies Today*, III (2000), no. 3.

[8] .B Sheppard, "Do museums make a difference? Evaluating programs for social change. Curator,", in *The Museum Journal,* VIIL (2000), no. 1, p. 63 - 74.

- Infrastructure: roads, parking, transport

The Political impact of a science center is its influence on government policies and priorities. It is its impact on all levels of Government.

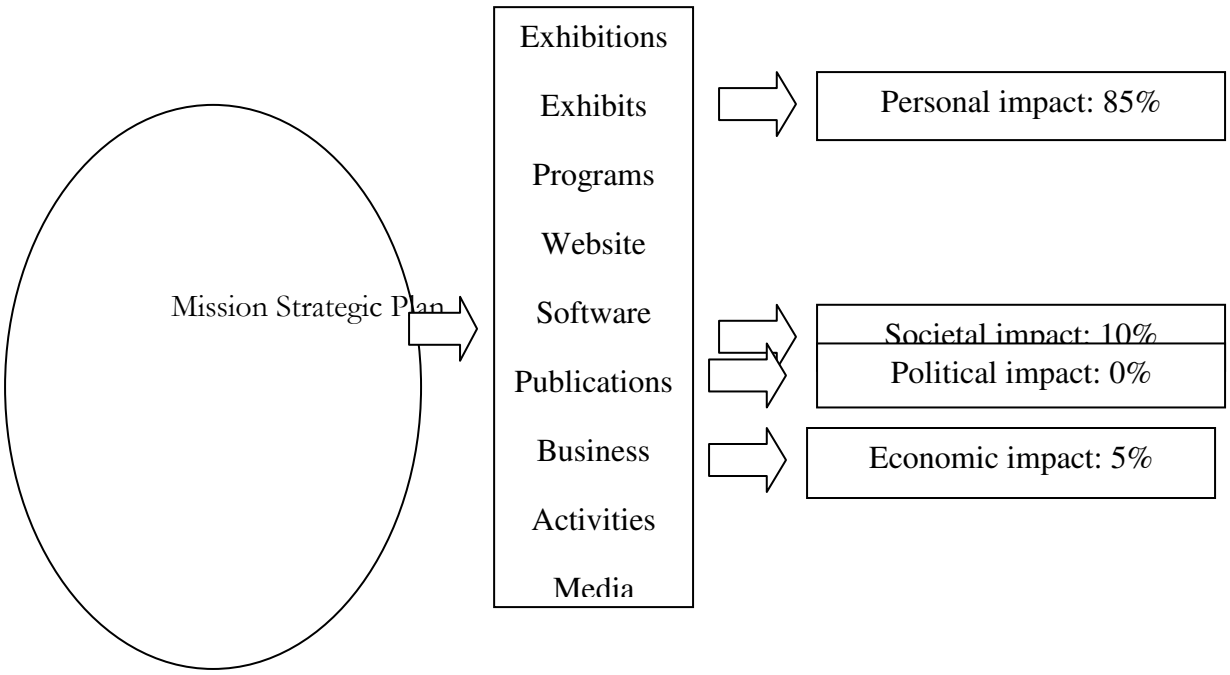
The Economic impact of a science center is the direct and indirect effect it has on employment and the local economy .[9]It includes measures such as:

- Income brought into the science center from visitors
- Income brought into community by visitors
- Science center expenditure
- Job creation for staff and outside providers

RESULTS

The number of studies of the impact of science centers has increased greatly in recent years. Science centers themselves are taking greater initiative in generating such research, as the need to be accountable to their funding bodies and the pressure to reach wide, diverse audiences has increased. The analysis in this report is based on the reports provided by science centers and colleagues rather than from a complete survey of the literature in the field.

ScienceCenter



[9] .I Morey and Associates, I. (2001). "Economic Impact Analysis of The Tech Museum of Innovation on Santa Clara County 1999,", in *The Tech Museum of Innovation*, I (2001), p. 30.

Published and unpublished reports seen in this study

By far the majority of the reports received (85%) focus on aspects of 'Personal impact'. Some studies relate to Societal impact (10%) and Economic impact (5%) and, perhaps predictably, there were no published or unpublished studies on the Political impact of science centers.

The Personal impact of science centers Percentage of reports relating to different categories of personal impacts

Science Learning	Change Attitudes To Science	Enjoyment	Career Choice	Other
52%	20%	12%	9%	7%

Within the Personal impact category most studies are concerned with science learning in science centers. Some studies look at the effect of science centers in changing attitudes to science and the enjoyment of visitors. A very few are concerned with the impact of science centers on career choice and on the professional development of teachers.[10]

The figure above shows that 50% of the research studies collected focused on students (primary, secondary and tertiary students). Studies of families, teachers and young children were much fewer. The frequency of research studies for particular audiences does not reflect the frequency that these groups visit science centers.

Rennie and Williams (2000) [11]studied the effect of a visit to a science center on the image of science held by adult visitors. 'In summary, the findings of this research are very encouraging. Clearly, a visit to the Center makes a measurable impact on most of the visitors. Given the short time of the visit, that adults often were in charge of children, and that they all bring unique combinations of background knowledge and experiences and consequently have different visit experiences, it is surprising that any effect was measured.' However, the authors express some concern that, as a result of the visit, visitors became stronger in their opinion that scientists agree with each other and that science provides definite answers – views that do not reflect an increased understanding of the way that progress in scientific knowledge is made.

[10] .D. H Salmi, *Career choices and Heureka. Unpublished memo*, Heureka The Finnish Science Center, 2000.

[11] .L. J Rennie, G. F. Williams, *Science centres and the image of science. Annual meeting of the American Educational Research Association,* New Orleans, 2000.

Falk (2001)[12] have stressed the important role of 'free-choice learning' in the public understanding of science i.e. learning from out-of-school educational experiences.As part of a ten year L.A.S.E.R. project that they are undertaking in collaboration with the Californian Science Center, they interviewed over a thousand Californian residents and found that they had a high level of interest in science and technology, regardless of age, race ethnicity, income, education and gender. The people they interviewed also considered that their knowledge of science was average or slightly higher than average. Almost everyone could name at least one area of science that really interested them and nearly half of all those surveyed said they had learned their science and/ or technology during their leisure time [13]. Museums ranked fourth, after books, life experiences, TV and school as a source that interviewees used 'some or a lot' for learning about science and technology.

'In summary, what do we know about the impacts of informal learning in science museums, zoos and aquariums, and where should we go from here?

1. That there are some impacts, and they are intellectual, emotional and physical, planned and unplanned.
2. The orientation, both psychological and spatial, is a very important factor that can influence impacts, positively and negatively.
3. That impact are socially influenced and enhanced, most positively by exhibit characteristics that are appropriate to informal learning such as interaction, sharing, parental guidance and intimacy between visiting group members.
4. That impact are environmentally influenced and enhanced, most positively by exhibit characteristics that are suitable to informal learning settings, such as concrete experiential activities, reinforcement of concepts and efficient communication techniques.
5. The measurements of specific impacts with the traditional tools of experimental design are often inappropriate for the confounding variability of informal settings, making the results of such assessment often disappointing or insignificant.
6. That impact can be positively enhanced by using visitor feedback during the planning and development stages of exhibit design through front-end and formative evaluation.
7. That evaluation is essential to increasing the success of informal science learning in museums.
8. That future research on impact in museums needs to combine multiple, systematic methods and strategies that are appropriate to the voluntary, social, intrinsically motivated experiences that visitors have.
9. That there is a lot of room for improvement, even though visitors are coming to museums in droves and rarely complain.

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[12] .J. H Falk (ed.), *Free-choice science education*, New York and London, Teachers College, Columbia University, 2001.

[13].J. H Falk, "The contribution of free-choice learning to public understanding of science," in *Interciencia*, XXVII (2002), p. 62-65.

10. That improvement in the amount of impact on informal science learning in museums - and its objective appraisal - is essential if museums are to be held accountable to their claims of having an educational role in society.'

Conclusion

In this project, over 100 papers were collected in response to a request for reports on the impact of science centers on their surrounding communities. The majority of research studies were found to concentrate on the impact of science centers on individuals. There is a need for more *long-term* studies of the impact of science centers on individuals. Some recent, long-term studies demonstrate that visits to science centers foster further interest in science and stimulate further enquiry far into an individual's life. New ways of questioning visitors are showing that almost all visitors gain some degree of learning from their experiences in science centers.

There are a small number of studies of the economic impact of science centers. These show that considerable employment and income is generated by science centers. More economic impact studies would contribute to a stronger public awareness of the positive effects that science centers have on employment and income creation in their local area.

The results of research into the impact of science centers are particularly valuable for the science centers that commission the research. However, it is helpful for other science centers if the initiators share their findings so that other science centers can quote the findings to substantiate their own cases. It is also beneficial for science centers to share the methodology they use for their research so that the results of several studies can be combined to make a stronger case for science centers as a whole.