Pak. J. Biochem. Mol. Biol., 2019, 52(1):29-36

Development of an entrepreneurial mindset of postgraduate students

Shahid Qureshi[1] and M. Kamran Azim[2]

[1]Center for Entrepreneurial Development, Institute of Business Administration Karachi-75270, Pakistan.

[2]Department of Biosciences, Mohammad Ali Jinnah University, Karachi-75400, Pakistan.

*Corresponding author: Email: kamran.azim@jinnah.edu; mkamranazim@yahoo.co.uk

Abstract

The era of entrepreneurship emphasize the development of enterprise skills among scientists. Science and technology graduates with entrepreneurial mindsets are often drawn to innovation, opportunities and new value creation. We carried out an experiment of teaching entrepreneurship to doctoral students from chemistry background. Key component of our methodology was use of effectuation theory of entrepreneurship. The experiment described in this paper was found useful to motivate entrepreneurship in scientists.

Introduction

The internet revolution has made a great impact on the corporate sector. The American corporations are on decline and with that there are fewer job opportunities [1]. The uberisation process has led to the creation of thousands of entrepreneurial opportunities and the traditional jobs and careers are difficult to find. The internet revolution has transformed the carriers into jobs and jobs in to tasks [1]. The uberisation process has brought down the transaction costs and the cost of starting a business is going down and in some cases has gone down to as low as 50 USD.

In this changing environment, the students have to be equipped with entrepreneurial mindset with capabilities like how to work with the least amount of resources and to use the slack resources around you, boot strapping, by understanding your own potential by knowing who you are, what you know and whom you know, by learning how to take calculated risks, learning to cooperate and leverage your networks and on how to leverage your surprises and a focus towards action [2,3].

On the contrary, the courses being offered to students of science and technology in undergraduate and postgraduate programs are designed to prepare professionals for large resource rich corporations. The availability of resources is considered as given and the participant will just have to use the abundant resources to achieve the company goals. This leads to a mindset which is looking for a long term career and a stable job. Many universities are encouraging their faculty and research teams to collaborate with industry to solve their problems and identify opportunities to add value to the industry. Despite many efforts there has been very little success in developing industry academia linkages especially in the developing countries. The university faculty complain about the very low interest and laid back attitude of industry in sharing their problems and funding research projects. The industry on the other hand is not ready to trust the academia for research work.

Burachik et al. [4] carried out an experiment to teach entrepreneurial skills to the biotechnology students in Argentina. In the first phase, the students carried out market research and tried to find out suitable business opportunity. This is followed by a financial feasibility and a business plan. In the second phase, the students worked on the business idea development.

Since 2010, several approaches have been tried at the Center for Entrepreneurial Development (CED) at Institute of Business Administration (IBA), Karachi, Pakistan to overcome this challenge. One approach was to introduce entrepreneurship as a course and train the faculty and students on how to proceed with a technology based venture. Various small workshops were carried out explaining the entrepreneurial process and how to develop a business plan. An intervention of more than a couple of years led to nowhere. A thorough analysis revealed the reasons which lead to the failure of the earlier teaching model. The teaching model was based on teaching entrepreneurship as a process. The key steps in this process was as follows

1. Develop a vision and goal for your business.
2. Based on the vison, develop a business plan consisting of the marketing strategy (details of the product or service, pricing, promotion and placement), human resource strategy (people required for the vision, hiring strategy etc.), operations strategy (layout, location, production strategy) and the financial strategy (how much money is required and where to raise from).
3. After the completion of the business plan, the next steps were execution and implementation.

The problem with this process is that the participants are told to make a great vision and do something which is not only technically and economically feasible but offers high returns. The bias towards a great vision and big thinking forces the participants to think in a big way and they make their business plans which are financially heavy. They start thinking in terms of a good office for business, money for purchasing new and state of the art machines, the best location and layout for the business, the best possible team and HR practices. They start expecting that as they will easily convince people in financial institutions and VCs or Angel investors, based on their grand ideas. Majority of these great plans faced a refusal as we went through this mode of teaching. This mode of teaching led to the following;

- This led the participants to think in very big terms which made them dependent on borrowed money from financial institutions i.e. banks, VCs and Angels funds.
- To look for specialized people i.e. the need to hire specialists in technology and marketing. They soon discovered the heavy cost of hiring these specialists.
- The fancy dreams of having a great location and layout proved to be very costly.
- The sense of urgency to become very big in a short span of time.

In the model mentioned above, the vast majority was not able to raise money and engage people for their business plans and had to abandon their projects. This further led them in to a state of hopelessness and disappointment. Brown et al. [5] report a similar experiment which was carried out in South Africa. The traditional approach of developing a vision, mission, SWOT analysis, location analysis, safety analysis misled the students from the original business and product idea and the students wasted a lot of time in imagining an uncertain future and got carried away in producing large business plans.

The new experiment

In 2015, a novel way of teaching entrepreneurship was introduced at International Center for Chemical and Biological Sciences (ICCBS), University of Karachi, Karachi, Pakistan. ICCBS is one of the finest research and training centers in its field in developing world. This center is situated in largest academic institution of Pakistan i.e. University of Karachi (Karachi is the financial center and largest city of the country). ICCBS carries out research, training and service delivery in the chemical, biological and biomedical sciences. More than 400 students are enrolled in ICCBS for Ph.D. is chemical and biological sciences. We designed a 1.5 credit hours course spread over a

semester for Ph.D. students of ICCBS. Around 20 students at their final year of Ph.D. studies enrolled for this course. The backgrounds of participants of this course were biochemistry, organic chemistry, microbiology, pharmacology and related sciences. Based on entrepreneurship teaching experiments carried out with engineers and technologists at the IBA, it was observed that the motivation and intentions to start a business can be enhanced significantly by approaching with a new method of teaching entrepreneurship.

The key components of this methodology was as follows

- Use of the effectuation theory of Entrepreneurship. Instead of making great visions and then arranging the resources and means to pursue those visions, the participants were taught the effectual principles of entrepreneurship (Read, Sarasvathy, Dew, Wiltbank, & Ohlsson, 2010). According to the effectual principles the participants start with their means i.e. who they are, what they know and whom they know. Based on the identified means, the participants find out the possible goals which can be achieved by finding an opportunity or solving a problem.
- In addition, the participants were taught to take a calculated risk [6]. The participants were taught to use a fraction of resources i.e. time, effort and money to start a new venture. This approach drastically reduces the risk of starting a business as the participants proceed with only what they can afford to lose.
- The participants were trained on how to leverage their network and develop a cooperative mindset.
- The importance of flexibility in defining and achieving goals was emphasized.
- One module covered the social, environmental and ethical dimensions of business.

The above mentioned concepts were delivered using a variety of pedagogical techniques i.e. lectures, case studies, experiential exercises, videos and guest speaker sessions.

A brief description of the above is mentioned as below

Lectures and case studies

The course began with the introduction of the effectuation theory of entrepreneurship (Read, Sarasvathy, Dew, Wiltbank, & Ohlsson, 2010) using lectures and case studies. The students were taught on how to identify the resources around them and how to leverage them to achieve small goals. Following table describes the use of case studies to achieve the objectives.

Burt's Bee cases study	This case describes the entrepreneurial journey of a lady which used the available means i.e. wood from the jungle, wax from the forest. With her passion and knowledge of making candles and lip balm, she started a venture with less than 400 USD. The business began by selling her candles and lip balms to few customers in the local market and was eventually sold for 177 million USD after a decade.
Linked In case on technology entrepreneurship	This case describes the journey of two students and their supervisor Prof Wilson at the Resnsellar Poly technique Institute. The trio started the business based on their research work in the university lab. They pooled 1000 USD each, use the basement of the professor as an office, the university lab was borrowed for free for research work and they hired few research assistants.
Ice Hotel	This case describes the story of Mr. Nils who started a small business after getting degree in environmental engineering with a very small amount of resource i.e. 500 USD. The company later moved in to tourism, ice sculpturing, ice hotels etc.
Polycon What Next?	This Pakistani case describes the journey of Mr Ihsan and his son-in-law. The two started a small chemical manufacturing business with the help of a friend in the UK. They used rotational molding technique to make plastic products. The business started with a meager investment of around 8000 Pounds Sterling. Some equipment were modified to reduce the cost. They eventually become one of the leading companies in plastic products in the country.
Beeharry (Water Chemistry)	This case describes the story of Mrs. Yasmin Ghias, a women entrepreneur. Mrs. Yasmin faced a problem of kidney failure in her family members. She started reading chemistry and with the help of her husband established a small water treatment plant in her basement. She started selling her product to relatives and the word of mouth

	marketing brought more customers. Currently, her company is serving more than 900 customers in Karachi, Pakistan.
Animal Feed	Mr. Aftab, one of the students at the IBA, started a small business with less than 500 USD. He used the knowledge of his brother to make feed for cows and buffaloes. The feed was well accepted in the market and the demand is growing. His other brother invested in to the business and they moved towards large scale manufacturing and became a leading player in animal feed in the area.
Kold Kraft	Kold Kraft is a Pakistani case of Mr. Tariq who used his knowledge of mechanical engineering and chemistry to start a small business of air conditioning. He used his savings to initiate the enterprise and after a few first customers he is able to find more.

The above mentioned case studies become very instrumental in changing the mindset of the participants. These case studies provided them the courage to believe and leverage the resources available with them. Moreover the resources available to each individual are idiosyncratic. This enables the individual to do something unique and quickly. The mindset module was reinforced by guest speaker sessions with similar stories and other assignments/activities i.e. interview an entrepreneur and video cases.

After the completion of these modules, the students were exposed to the experiential module.

Experiential Entrepreneurship

Each participant was provided with a business startup model canvass to work 0on his/her project. The students identified the means they have by answering the questions; (a) who they are, (b) what they know and (c) whom they know (bird in hand principle). They were further asked to figure out their affordable loss in terms of time, money and effort. Based on the bird0 and hand and affordable loss, the students worked on the identification of problems and opportunities in their surroundings. Each student were asked to find 3-4 opportunities.

In the next step, the students were asked to work on the unique value proposition, the expected cost, and the potential collaborators and to identify their first few customers. The participants were

then asked to short list the idea which suits best to their vision and make a short term plan of action. The students were given few weeks to pursue their start up business canvass. The participants had access to mentors and faculty at both the ICCBS and the CED, IBA. The participants also had access to experts in marketing, intellectual property, and legal issues related to company startup [8,9].

Conclusion

This mode of teaching entrepreneurship was found useful to motivate entrepreneurship in scientists. Most of the students come up with a small startup model and presented to the faculty. They were graded based on the startup business model and the actions taken to execute it.

References

1. G. F. Davis, The vanishing American corporation: Navigating the hazards of a new economy, Berrett-Koehler Publishers., Oakland (2016).

2. G. Fisher, Effectuation, causation, and bricolage: a behavioral comparison of emerging theories in entrepreneurship research, *Entrepreneurship Theory and Practice*., 36(5), 1019-1051 (2012).

3. S. D. Sarasvathy, Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency, *Acad. Manag. Rev*., 26(2), 243-263 (2001).

4. M. Burachik, M. Vazquez and A. Koss, The biotechnology enterprise project: An exercise on the detection and development of business skills in an undergraduate biotechnology module, *Biochem. Educ*., 25(1), 31-34 (1997).

5. M. E. Brown, R. C. Cosser, M. T. Davies-Coleman, P. T. Kaye, R. Klein, E. Lamprecht and T. van der Zeyde, Introducing chemistry students to the “real world” of chemistry, *J. Chem. Educ*., 87(5), 500-503 (2010).

6. N. Dew, S. D. Sarasvathy, S. Read and R. Wiltbank, Affordable Loss: Behavioral economic aspects of the plunge decision, *Strateg Entrep J*., 3(2), 105-126 (2009).

7. S. Read, S. Sarasvathy, N. Dew, R. Wiltbank and A. V. Ohlsson, Effectual entrepreneurship. Taylor & Francis, UK (2010).

8. A. Tajonar, How to start a biotech company, *Mol. Biol. Of the Cell*., 25, 3280-3283 (2014).

9. A. K. Yetisen, L. R. Volpatti, A. F. Coskun, S. Cho, E. Kamrani, H. Butt, A. Khademhosseini and S. H. Yun, Entrepreneurship, *Lab-on-a-Chip*., 15 (18), 3638–60 (2015).

10. L. J. Langer, Building a curriculum for bioentrepreneurs, *Nat. Biotech*., 32 (9), 863-865 (2014).