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How to become innovative: measuring and improving innovative development

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A case study on the innovative development program at The Hague University of Applied Sciences

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ABSTRACT

Innovative development is a program that is given at The Hague University of Applied Sciences. This program teaches students to become more innovative. This article will look into the current approach and measure the growth in innovativeness of the students over the years. This was measured with a survey, based on the Berkeley innovation index. The results from the survey were calculated and scored based on eight factors. The innovative development program was compared with another program called information security management. These programs are from the same faculty. The information security management program did not show significant growth over the years in innovation. The innovative development program had resulted in a significant growth in innovativeness over the years. Some of the factors could be improved to increase the effectiveness of the innovative development program.

1. Introduction

1.1 Innovative mindset

Innovation has become increasingly more important in the 21st century. However, innovation has been an important activity through the ages as it helps with the advancement of humankind. An important factor when trying to be innovative is to have an innovative mindset [1]. Is it possible to gain or improve an innovative mindset? Research shows that it is possible to change and train your mindset [2]. However, it is very difficult as the human brain will resist a change of mindset. There are indications that this can be overcome with a lot of practice. Most of the time creativity and innovation are seen in combination, but there are a lot of factors to consider when talking about innovation. The use of an innovative mindset and behaviour will give every individual the opportunity to demonstrate an innovative performance and provides a competitive advantage [5].

There has been a long debate about whether innovators are born or made. Social cognitive theorists place greater weight on social learning others, trait theorist, and assume that innovators are born innovators [6]. An individual's 'mindset' comprises knowledge, beliefs, attitudes, values shaped in response to social contexts and influenced by emotions and feelings. Together they direct the individual's behaviour. The social cognitive theorists assume that behaviours, beliefs, attitudes, values and skills may be learnt. This suggests that it should be possible to teach innovativeness. For this reason, The Hague university of applied sciences (THUAS) is trying to include programs that teaches innovativeness.

1.2 Innovative Development program

Currently, there is a program called innovative development (ID) at THUAS. It prepares students for innovative jobs such as working in a R&D department. The program struggles with teaching innovation as the method lacks a way of measuring progress. The current approach of the program is to give the students projects and challenge them to complete the project as innovative as possible. The aim of this approach is to improve the innovativeness of the students.

1.3 Goal of the research

There is a gap between theoretical approaches found in innovation and how these approaches can be put into practice. THUAS would like to train the students to become innovative professionals, but they also want to understand more on how they can measure the growth of innovativeness of the students. Findings from the literature survey show that there are multiple factors that need to be taken into consideration when trying to improve or gain an innovative mindset such as, innovative environment, personality attributes, education and mindset [3]. These elements have provided multiple methods to train an innovative mindset. Trying to change a person's mindset, or way of thinking and doing things, is hard, because the human brain mounts a resistance against these changes. Innovation is a complex subject

that requires different approaches to support the development of innovative skills [4].

The goal of this research is to study if the current approach of the Innovative Development program is effective and to analyse if there is a way to improve the Innovative Development program. This study will focus on a tool called the Berkeley innovation index (BII) [7]. This index will be used to measure the progress of the development of innovativeness skills of students and to measure how the ID program is currently improving the students' innovation. The score is determined by eight factors from the BII. The results of the measurements will be used to determine which aspects of the program can be improved and be used to write a recommendation to THUAS. There will also be a literature research on how to improve the factors of the BII survey.

2. Methodology

2.1 research methods

To examine the effectiveness of the current approach for the ID program, a survey based on the BII [7] was used. This was done to measure the growth of innovativeness. Two groups of students were included in this study. Students from the first, second and third years, who participate in the ID program, were compared to a control group of students from the Information Security Management (ISM) program. The two programmes ISM and ID have students that study in the same faculty (IT&Design) and are studying at the same location in Zoetermeer THUAS. The students from the ISM program were chosen because they form the closest available control group with persons from the same school.
The methodology of the BII survey consists of different approaches of innovation and it measures how the students apply these approaches in their own life cycle.

2.2 Berkeley innovative index

The results of the BII survey contain eight factors. These factors are scored from 0 to 100, the higher the score the better. These results make it possible to identify which factors are currently lacking in the ID program. The methods to improve these factors will be done by literature research. This will give some knowledge on how the factors can be improved, but the effectiveness still needs to be tested. The average score in the BII is called the Personal Innovation Mindset Level (PIML) [7]. To accommodate the survey for students instead of business people, some changes were made to the survey. Some questions needed different interpretations as most students don't work at a firm yet. For this reason, firm was changed to classroom. However, this did not change the answers the participants could give.

3. Results

3.1 Participants

There were 84 students from THUAS that filled in the survey. Participants were from both the ID program and ISM Program. The total participants who filled in the survey were divided by 29 students from the ID program and 55 from the ISM program completed the survey.

3.2 Results analysis

Figure 1 shows that in the trend line in the ID program is steeper than the trend line in the ISM study. The steeper the line, the greater the growth in the score between the years. Figure 1 shows the average score of the studies over the years. The ID score is higher in each year compared to the average of the ISM years. It shows that the first and the third year of the PIML scores are higher than year two. Only in the third year there is a clear difference between the studies. All the third year ID student score higher that the third year ISM students.

3.3 Statistical analysis

To measure the growth in the different years, an Independent Sample T-test was applied. This test measured if there was a significant difference between the years one and three of each study. The statistical analysis showed that there was a significant difference in the PIML scores between the first year ID (M=73.56, SD=4.00) and third year ID (M=80,49, SD=3.13) programs; with t (15) = -3.66, p = 0.002. There was no significant difference in the scores of the first year of the ISM (M=68.78, SD=9.63) and the third year ISM (M=70.09, SD=4,93) program; t (8) = -0.22, P= 0.83.

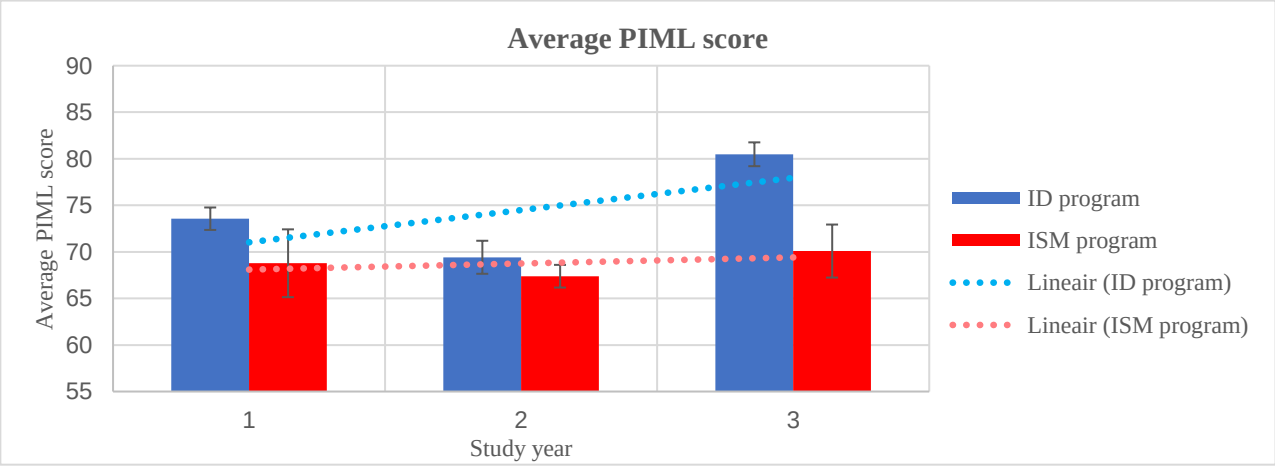

Figure 1. Graph showing the average PIML score of the two studies. The lines show a linear growth. The whiskers show the standard error.

The results show that the current approach of the innovative development program is working effectively. By giving the students innovative projects to work on, it helps them to train their mindset to become more innovative.

4. The ID program

4.1 Factor performance ID program

The eight factors were also measured for each student that filled in the survey. This was done to analyse which factors were scored higher by the ID students and on which factors they scored lower. This is important as it will determine what factors should be focused on during the ID program. As seen in Figure 2, the three lowest factors are innovation zone, trust and comfort zone. Therefore, it is recommended to put more focus on the three lowest factors, as the other factors all score above 70.

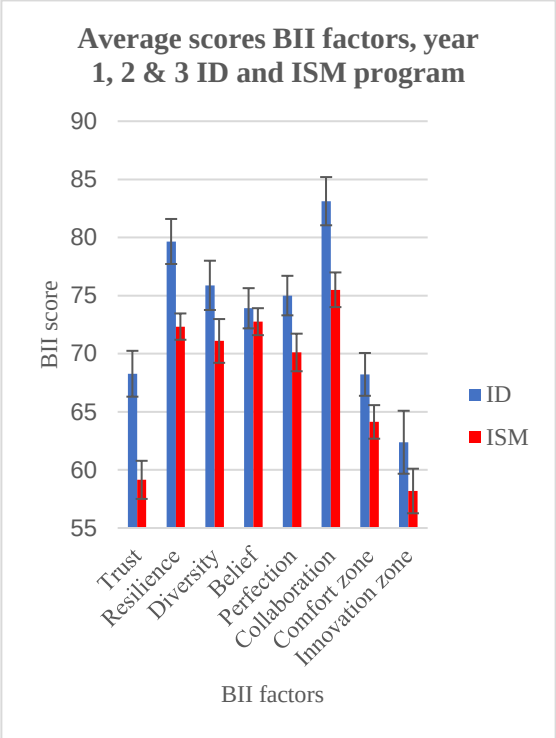

Figure 2, this graph visualizes the average factors from the BII. The whiskers show the standard

4.2 Improving innovation in the ID program

4.2.1 How to improve or gain an innovative mindset?

Now that we know how the ID performs on each factor, it is interesting to learn how to improve these factors. The results of the BII survey provided us with eight categories: trust, resilience, diversity, belief, perfection collaboration, comfort zone and innovation zone. These categories were analysed for factors that could help to improve the innovativeness of a person. These factors are explored further below.

4.2.2 Trust

Findings show that the first step to improve trust is by accepting fear. Secondly by learning to appreciate yourself and others. Thirdly, learn to trust yourself and have self-confidence. Fourthly, become more curious about yourself and lastly, take small steps [15].

4.2.3 Resilience

Research suggests that resilience could help someone to become stronger, especially in difficult times. Research also suggests that being resilient could give individuals the ability to tackle setbacks and have the best chance at succeeding. Therefore, focus on developing an environment where everyone feels safe and supported. Encourage others to try new things and emphasise the growth and learning opportunities they are presented with when they fail or make a mistake. Being able to learn from mistakes and challenges in a place where each individual feel supported and encouraged will build their confidence, self-belief and resilience [13].

4.2.4 Diversity

Findings show that it is commonly believed that ‘diversity of the people’ stimulates creativity. However, from a practitioner’s point of view ‘diversity of the mind’ of the participants is the real key to creativity. It is important to interact with people different from yourself, as you might get different ideas or methods when you are working with people who do things different than you[11].

4.2.5 Belief

A paper has posed an argument for development of self-belief including aspects of belief in ability and environment in context [14]. The end point of this development is viewed as a student/graduate able to enact understanding and skills through:

- Belief that their ability can be developed and improved to allow for attainment of their goals.
- Belief in their ability to plan and execute action to achieve their goals.
- Belief that the environment/context will allow for goal attainment.

To take belief in one’s ability and perceived control is a powerful combination in enabling use of skills and understanding to achieve success [14].

4.2.6 Perfection

Findings suggest that perfection is a hard subject because it is not always feasible to make things perfect, therefore there are some steps you could take to improve your way of working without becoming a perfectionist.[10]

- Step 1: Set high standards for yourself but give yourself a break. A good rule of thumb is to aim for 80-90% of your max.
- Step 2: Be sure to acknowledge the good parts of your performance. No matter how many mistakes you may have made, few performances are completely devoid of positives. Don’t fail to notice what you did well.

- Step 3: Give yourself some credit. If you do a great job, give yourself a ‘pat on the back’. Don’t tell yourself you were just lucky.
- Step 4: Take talent off the table. If you do make mistakes, avoid assuming that this means you’re not talented enough.

4.2.7 Collaboration

Collaboration is the “mutual engagement of participants in a coordinated effort to solve a problem together.” [8] Research shows that collaborative actions are often described as interactive, interdependent, negotiation and shared goals. The efficiency of collaboration is based on multiple factors such as: student characteristics, group composition, and task characteristics. To improve the chances of a better collaboration, participants should be encouraged to communicate, coordinate, resolve conflicts, make decisions together, solve problems and to negotiate. These actions emphasize the qualities that should be trained for collaboration. Such as providing an elaborate explanation, asking direct and specific questions and responding appropriately.

4.2.8 Comfort zone

As quoted in Bardwick, Yerkes and Dodson were the first to investigate the impact of ‘anxiety’ on performance in their 1907 experiment [16]. They found that anxiety improves performance until a certain optimum level of arousal has been reached. Beyond that point, performance deteriorates as higher levels of anxiety are attained. This result points directly to the conclusion that increasing anxiety will boost performance and that too much anxiety will decrease performance. They could conclude that either case will cause the subject to move out of their comfort zone. Learning to control your anxiety levels will improve your performance.

4.2.9 Innovation zone

The physical space in which individuals work matters for both efficacy and efficiency. Smart workspace design can improve the way in which individuals communicate and coordinate their efforts. Findings suggest that it is important that the innovation zone is adequate to host all the different requirements for activities that are associated with innovation. For example, some activities demand paying attention with all of one’s senses to understand motivations and behaviours of target customers, while other activities require the quiet and thoughtful search for patterns and other activities require to collaborate with small groups [9]. For this reason, one should prepare the workspace according to the activities that will be done.

5. Discussion

We found that there is a significant difference between year one and three in the ID program. That means, over the years, students get significantly more innovative by following the ID program. Contrary to the ID program, the ISM program doesn’t show any significant growth.

There are lower PIML scores in the second year compared to the other years. This might be explained by the late start of the ID program by some students in the second year, thus without an early innovative training prior to their second study year. To further investigate this, it would be useful to study the results in students that follow the ID program from year one till year three and to measure their growth in innovative skills. This however will require a three year long study period.

The results of the BII scores provide a basis for recommendations. These recommendations provide tips on how to improve each factor the BII measures. These tips vary in effectiveness based on personality [4].

The execution of this research was limited by the global COVID-19 pandemic; therefore, no human interaction was possible. The students that had fill in the survey were getting online education. The results of the survey might have been different if there had been no pandemic or social distancing.

This research only looked at the ID program of THUAS. It might be interesting to also analyse the approach to teaching innovativeness by other schools in the country. These comparisons could provide further insight on how to improve innovativeness.

6.Conclusion

According to the results, the current approach of the ID program is effective in teaching innovation. The difference between the ISM program and ID programs suggests that participation in the ID program could help you to become more innovative. The ISM students’ growth was a lot less than the students that followed the ID program.

However, there are three factors: trust, belief and innovation zone where ID students scored the lowest. This suggests that THUAS can focus on these factors to further increase the innovative skills of students of the IT&Design faculty.

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