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Project Performance Improvement: 15356
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Submission date: 21/11/2015

Contents

Application of social learning theory to boost technician skills and performance in a construction project

Abstract

Skilled labour force is an essential part of a construction project. Every construction project has different phases. Transitioning between phases dictates the need for different skill sets and it is crucial that every organisation manages its labour resource efficiently to avoid *skill gaps* that could lead to its downfall in this highly competitive world. Being constrained by a limited labour force with a significant *skill imbalance* during the transitioning of two phases, the author had to come up with a plan to alleviate this situation by training the unskilled technicians within a short period of time due to the steady increase of tasks and multiple end dates. The author created a strategy to train them within a month while steadily increasing the pace of work. Using the *modelling process* of a *social learning theory* with other learning styles incorporated in parts, the author was able to eventually fill the skill gaps necessary for the next phase within the planned time. The author eventually provides *a reflection* on the methods used by him that proves that although the techniques were efficient, there is room for improvement.

Key words: Reflection, Social learning theory, modelling process, skill imbalance, skill gap

Introduction

Construction is a trade where several factors play a role towards the same goal. Technicians and labours provide the critical resources required to achieve project goals. In a construction project particularly when it spans more than a year, a certain percentage of technicians and labourers join and leave according to the project's and their needs. It is vital for the company to track and control the level of skill imbalance. When a company lacks adequate amount of skill labours, its ability to be competitive, a factor that is increasingly important in a rapidly changing market, will be effected (Workforce NT report 2004, 2004).

Air conditioning (AC) installation for a major construction project was awarded to the company where the author was employed as an assistant engineer. As a way of controlling the skill imbalance, the company provides incentive via an annual bonus scheme for all technicians and professional development for the top five performers. Technician performance reports were provided weekly to management by the engineers and supervisors, this data was used to identify the top five technicians.

Since, the company had limited skilled technicians working across multiple projects, they already allocated a limited number of technicians to be transferred to this project and newly employed unskilled technicians to cover this project's resource requirements. This caused a big skill gap which had to be reduced within a short period of time due to the amount of tasks escalating over time.

This paper will describe the project's need to assess the e amount of skilled technicians in the trade before discussing on the steps taken by the author to ensure the skill gap was filled in time. Finally the lessons learned through reflection will relate the steps taken via Bandura's modelling process of his social learning theory (Attention, retention, reproduction, motivation) (Bandura, 2006).

Project Description

The AC installation had three phase delivery process, every phase had several tasks and sub tasks to be completed to time and quality to commence the next phase. The tasks included in each of the phases were:

- Phase 1
    - Scope: PVC installations to create pathway for AC ducts to connect the internal and external AC units.
    - Dependency: This had to be completed during concrete laying and brick wall building.
    - Resources: 5 Technicians
- Phase 2
    - Scope: AC ducts installation. They connect the internal and external AC units together.
    - Dependency: Completion of Phase 1 deliverables

        - Resources: ~10 to 15 Technicians - double the amount of skilled technicians required for this phase due to its demanding high detailed orientation in installation procedures.
- Phase 3
    - Scope: Internal and external AC unit installations.
    - Dependency: Completion of Phase 2 deliverables
    - Resources: Minimum 15 technicians were required for this phase in addition to the overtimes performed during the last five months of the project

AC installation is a very structured process and it requires specific skills to complete the tasks under various constraints such as: technically complex jobs; constrained delivery timeframes; sudden changes in deadlines; accessibility constraints; urgent repairs; and requires that lateral thinking and problem solving on demand. Therefore it was vital that the author had enough skilled technicians under him to mitigate any possible project delays.

The author was employed during the transition between the first and second phase of the project. The company having employed only five technicians for this project so far, had already planned to include only an additional three to five skilled technicians from their other projects and five new unskilled technicians within the two weeks due to their low cost of salary. The author aware of the skilled imbalance created, had to create a strategy to train the new technicians to equip them sufficient technical capability within a short period of time.

The approach

To start with, the author rated each technician from the aware to highly competent level depending on their performance, quality of work, perceived knowledge of the tasks and the achievement of daily targets. To set the targets, the author gave a set of similar type of tasks to all the technicians on different times and dates, he then timed their performance individually and reviewed their quality of work. This gave the author a baseline for the complexity level of each task, and using that information he was able to allocate teams and define daily targets and weekly performance report. This knowledge aided the author to include new unskilled technicians without causing schedule overruns.

Once the daily targets were established, the author organised the unskilled and the skilled technicians into groups depending on the amount of technicians required for a task and the skills necessary to complete it. Firstly, he mixed the unskilled technicians with all the highly skilled ones then distributed the balance according to the competency level of the technicians.

The untrained technicians were asked to assist with tool and heavy materials and also observe how their seniors worked for the first few set of tasks before getting involved in any installations. For instance, if the team's target was to install five indoor AC, the unskilled technicians were asked observe the first two or three installations before they could actively participate in the next installation. This gave them an opportunity to learn about the safety procedures, rules and regulations required for the implementation. When they shadowed a senior technician, they were given easy parts to work on at first, with the senior technicians working on more complex parts. Supervisors and skilled technicians provided direction as necessary. The unskilled technicians were gradually given more complex parts of the

installation under supervision and by the end of the day they became aware of the task needs and were able to perform all the basic aspects of it.

The author ensured that he and the supervisors visited and checked on all the technicians at regular intervals to ensure the quality standards were met and to resolve any issues that arose.

The new technicians were grouped with the same senior technicians for two days and sent to different locations to complete similar types of tasks. By the end of the second day the new technicians had achieved sufficient capability to perform similar tasks on their own. Each week the new technicians would swap teams so as to work with three different skilled technicians, on different tasks and different locations.

By the end of a fortnight most of the new technicians became averagely competent in performing the tasks in that particular phase. At this point they were included with other senior technicians to work on urgent works with sudden deadline changes, repair any damaged materials and work in constrained environments. This gave them an in-depth knowledge on every aspect of their work and were able to work unsupervised when needed. By the end of the month they were no longer unskilled technicians.

However this was not enough to be a onetime strategy due to the changes in phases which necessitated different sets of skills to perform. Therefore at the beginning of every phase the now competent technicians required training in the new tasks. Nevertheless, their newly developed knowledge from the previous phase gave them a better level of competence to manage new tasks at hand. This gave them dual benefits: they were already able to perform some aspects of the new tasks, due to similarity, but under proper supervision of the supervisor and the senior technicians; the knowledge and skill utilised for the previous tasks will not diminish over time as it will be put to use in different ways; they learned to improvise due to the need to adapt their skills to complete different tasks.

Lessons Learnt

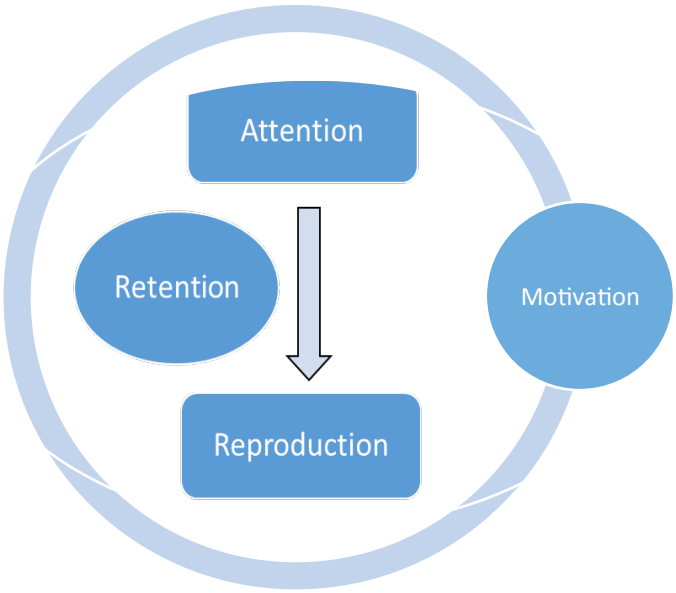
The training strategy used proved to be beneficial as the new and untrained technicians showed a gradual improvements to competency and knowledge within a period of a month, at which time they were able to perform unsupervised.

This aligns with Albert Bandura's social learning theory that consists of a four part modelling process; attention, retention, reproduction, motivation (Bandura, 2006). This is explained in more detail below:

Attention – In order to learn, attention to the subject matter is essential. Anything that disrupts or inhibits the focus will depreciate the learning capacity, this includes observational learning.

- Retention – Ability to retain or recall what is learned in the form of mental images and verbal descriptions.
- Reproduction – converting the images and descriptions into action. But first of all, the person has to have the ability to reproduce act the behaviour. The reproduction improves with practice.

- Motivation – Without motivation to imitate none of the above three will be useful. There will always be a reason for doing something and Bandura describes a number of motives.
    - Past reinforcement/punishment – traditional behaviourism
    - Promised reinforcement/punishment – incentives/threats
    - Vicarious reinforcement/punishment – seeing and recalling the model that is followed being reinforced/punished



Furthermore, the unskilled technicians learned through actions. "Action learning is working in small groups to take action on meaningful problems while seeking to learn from taking action" (Wankel & DeFillippi, 2005). When teamed with the skilled technicians, it gave the unskilled technicians an opportunity to learn the processes in a given task. They were asked to observe their seniors carefully, apart from minimal amount of work such as aiding in handling tools and heavy materials for the first few set of tasks. This way they were given a good chance to give their full attention to learning the tasks. They were supervised by the skilled technicians, supervisors and the author at regular intervals.

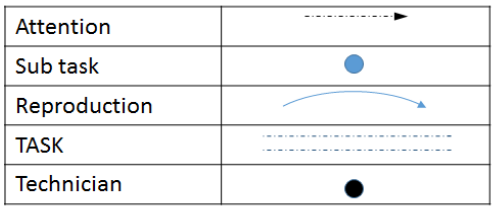
Giving them the same or similar types of tasks for continuous two days with the same skilled technicians had multiple benefits: it helped them to clearly understand the tasks; retain the information more easily; and reproduce the behaviour and actions properly.

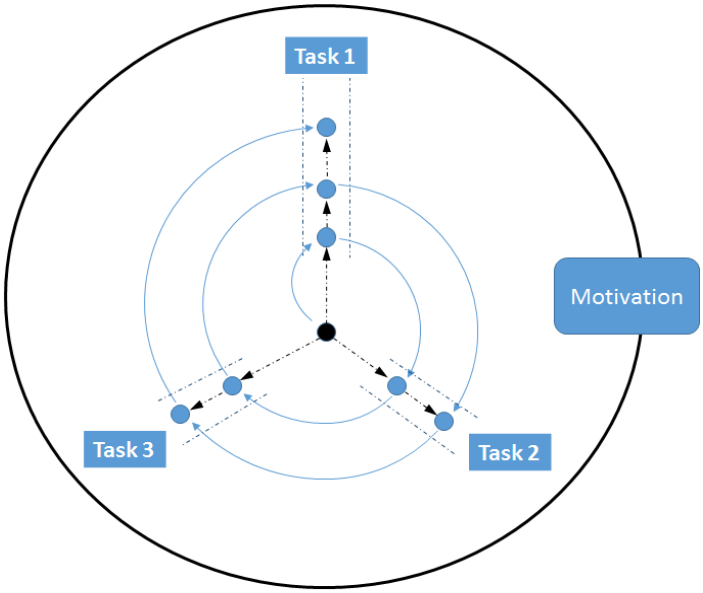
Through observation and the ability to communicate with their seniors on performing the first two/three tasks, they were able to retain the information via images and verbal description. Secondly, when they were allowed to begin perform the easier parts of the task, they were able to reproduce by imitating what they retained. This facilitated their ability to retain the new knowledge they had acquired and when performed multiple times increased their effectiveness at completing the task. Finally, while they performed on their parts, they were

also able to observe the more senior level work simultaneously or subsequently. This process reinforced the spiralling model of social learning.

In terms of motivation, forming the same teams for two consecutive days had its own benefits and drawbacks on learning speed. Firstly, giving them a similar type tasks in a new environment each day proved to be effective. It provided a sense of freshness leading to more focus and attention towards learning. Secondly, forming the same teams increased their ability to bond and form relationships. Although this may be advantageous, it proved to be less effective for some as this distracted their attention away from learning. Therefore, by switching them with three different skilled technicians in a week, the author was able to keep the impact at the minimum. Moreover, every skilled technician had their own unique way of completing each task, this increased the breadth of understanding and the ability to adapt and apply learning in a combination of environments and constraints. So the unskilled technicians were able to give enough attention and learn via applying, repeating, addressing individualism, and laddering activities which is also the four 'learning style themes' identified by Dave et al (Algeo, 2011).

Furthermore, to increase motivation and interest to complete a task it was important to provide sufficient challenge by introducing the technicians to three different typed tasks in a week. This provided a renewed learning environment which motivated and gave them the desire to learn something new.





Bandura's modelling process implemented in the project

Although, the excitement of working in a new company or work place was itself a motivator during the initial days, within two weeks the new recruits started showing symptoms of tiredness and demotivation. Therefore, the third week included urgent works and repairs challenges which acted as an incentive for their work. This increased the value to their weekly performance report. It also added other multiple benefits to each technician's learning process. By working on urgent works with tight deadlines, they used their knowledge and past experience to experiment and adapt according to the situation. The increased pressure

acts as another motivator, increasing their need to focus on what their seniors are doing and reproduce more effectively, thus making them more competent at the task. By increasing their involvement in any repair works, they had to assess the situation and consider options to resolve the issue. Autonomy, one of the job characteristics defined by Hackman and Oldman, motivates an individual through sufficient freedom and discretion given to decide the method to be used (Faturochman, 1997). Moreover, this gave them a better understanding of the materials and environment they are working in, which in turn, helps consolidate their thinking and retain their knowledge for future application. "A social learning and problem-solving process that generates valid information to assess deviations from desired goals. This information feedback provides the basis for a continuous process of goal directed action and evaluation of the consequences of that action" (Cross & Israelit, 2008).

Further improvement and limitations

When reflecting on the lessons learned in this project there are a number of limitations and improvements that could increase the project's performance in future instances. The mentoring or shadowing techniques employed proved to be successful however the author could further improve the efficiency and speed of the new technicians' performance.

The monthly income, yearly bonus and career growth prospects was a key motivator behind every technician's performance. The incentive for training, given at the beginning of every year, was highly valued by the technicians as this increased their knowledge base on AC installations and also provided professional certification. This increased their personal market value and thus raised ability to negotiate higher salary packages and their chance of becoming a supervisor.

As previously mentioned, the author, as the assistant engineer was responsible for generating weekly performance reports on technician performance. The author could have taken this opportunity to remind them of the training incentive and provide feedback at weekly intervals. According to Hackman and Oldman, job feedbacks on the effectiveness of a person's performance acts as a motivator to improve on their work (Faturochman, 1997). Knowing only the best five performers would be sent on the training program, every technician, especially the new technicians who didn't perform competently in the previous week, would have good incentive to increase their effort the following week. In addition, the senior technicians who had completed the advanced training could have provided their positive training experiences to the new technicians. This would have stimulated more interest with the new technicians and increased their willingness to imitate their behaviour.

Although this would have provided both promised reinforcement and vicarious reinforcement, it also would have acted as a vicarious punishment. The new technicians could have showed less interest in teaming up with the skilled technicians that had accomplished only one, or no yearly training programs, even though they were almost equally as skilled as the others. Therefore, if the author does not handle this carefully, he could create adverse effects on the impression on the technicians, and in turn the technicians may not cooperate well with those technicians who didn't receive training. Therefore, the author could have provided productive feedback on those skilled technicians and could have had a few examples to show their high competency level. For instance, explaining about when they

managed a complicated situation well or how hardworking and cooperative they were when in need.

Furthermore, not all the technicians who joined the company or allocated for the project will remain till the end. The new technicians had a tendency to leave the company when a better paid job comes up. Therefore, it was uncertain that after the one month of training, they would stay. The senior technicians who had a good reputation within the organisation were the first choice of the manager when a new project was initiated or when an ongoing project is critically behind schedule. If there had been such situation, the author's plan would not have worked as he would had had to create another strategy and consequently taken more time than planned.

Conclusion

Through the process of reflection, it is apparent that the method used by the author was effective. The process of allowing the technicians to first observe similar types of tasks then manage them, increased their ability to retain the information clearly and then reproduce it when required. Performing similar kinds of tasks, managing urgent works and repairing damaged materials helped to increase their knowledge and understanding of AC installation processes and improved their chances to manage more technically complex installations. Several incentives increased the technicians motivation to perform within the project, however there were some perceived limitations that could be considered to improve performance in future instances. Overall the approach chosen within the case study, to train the unskilled technicians, proved to be effective. However, there are opportunities for improvement and limitations to be considered.

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