A study visit to the virtual company

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Abstract

To integrate study visits to different workplaces in higher education implies important benefits for the course quality. The study visit gives the students a better understanding for the real situations they will meet in working life. However for practical and economical reasons is that not always possible.

The purpose of this project is to create a virtual company that shall replace the real one for study visits.

The goal is to create a realistic picture and that intended use of it can come as close as possible to a real study visit. It is also important to facilitate linking theory and practice.

The virtual company is built up by pictures, videos and text. All material is made available on a web page and when entering the students will meet a layout of the company. From that position is it possible to walk around and look at videos from different workstations. Besides that can they also listen to interviews with managers and representatives of staff as well as reading reports concerning productivity and the work environment. The focus of the study visit is work sciences, therefore the material also include some visualized information about work hazards. On the web page there are also a number of tasks for the students to carry out.

Until the autumn 2011, 132 students at Dalarna University have visited and produced reports from the virtual company. They were studying in programs for mechanical engineering, production technicians and human resource management. An evaluation among some ten students showed that the study visit to the virtual company is flexible in time and effective, but that students wish to have even more detailed information about the company.

Experiences from four years of use in a number of classes show that the concept is worth further development. Furthermore with production of new material the concept is likely to be applicable for other purposes.

Keywords

Virtual company, visualization, work environment, productivity.

Introduction

At Dalarna University courses focusing on the work environment are offered. The courses have been given within the programs "Industrial Development and Leadership", "Production Technician Programme" and "Human Resource Management". Many of the students following these programs will when they enter the working market in many cases be employed in positions where they are expected to have a basic knowledge in occupational risks at workplaces, how they can be controlled as well as the work environment legislation. A possible position for a student from e.g. the Industrial Development and Leadership program is as a managing director (MD) with a responsibility for work environment management. An important part of the work environment course is therefore to make the student prepared to shoulder this responsibility. Within this course would it therefore be desirable to have the chance to put the student in a real situation in a company where he/she could step into the role of the MD and practice to take all the responsibilities concerning work environment management that is involved in the role. There are many practical, economical as well as other reasons that make this impossible.

With this as a background was it discussed during planning of such courses how close to the desired situation it might be possible to come by building a "virtual" company that might be possible to put on internet for use by many students. It was therefore decided to start a project to "build" this company. The goal was to include so much information so that it should be possible for the student to enter the role as an MD. The answers to the questions about the situation and circumstances that was necessary should be possible to get. This project was financed by the former National Institute for Working Life and Dalarna University.

Material - The virtual company

It was decided that the virtual company should be a small engineering industry. The company should be typical for the branch which implied commonly used processes as well as work organisation. An important base for the virtual company should be videos as well as written information and other information that is necessary for the MD to have access to in this situation. To see the workplaces and to read about production as well as used machineries and the company's organisation is however not enough. When a more complete picture is needed is it also important to talk to persons working in the company. It was therefore decided that interviews with key persons should be included in the material about the virtual company.

Suitable companies for collections of material were search for in the Dalarna region. It was expected that a few companies was needed which together should form the "typical" company. After contact with and visits to a few companies interested to participate in the project was it however clear that one of them alone was sufficient for the needs.

One of the important basis for the virtual company was videos making it possible to walk around in the company and to see different work stations, machines and how the work is performed. Since the focus for

this material is the work environment and potential risks involved with the work was it important to collect a detailed video material making it possible to evaluate risks as well as seeing possibilities to improve the situation.

As a complement to the videos was it also necessary to add written information about type of production, used machines etc. Besides that was also different studies made on the company with a method for assessment of the productivity potential (Productivity Potential Assessment, PPA) (Almström et.al, 2007), a method for assessment of the work environment (Work Environment Screening Tool, WEST) (Bengtsson et.al., 1997) and a method for visualisation of workers exposure to hazards (PIMEX) (Rosén et.al, 2005).
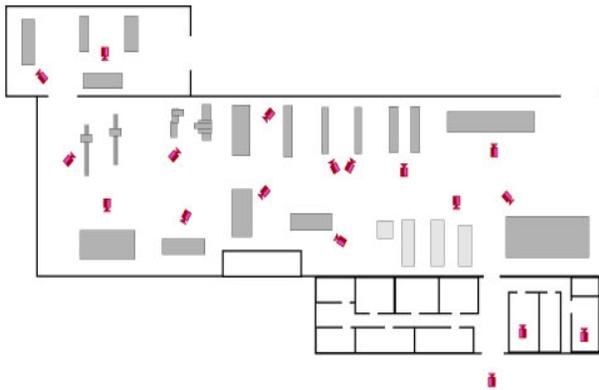

Figure 1. The layout of the virtual company with red camera icons.

Results

The virtual company

The virtual company has been made available on Dalarna Universities home page (Dalarna University, 2007). When entering the company is first a short introduction about the material and the virtual company made. On the next web page is a short description about the company, what they are producing, how many employees etc made.

One page is the entrance for a visit to the company. Here is a layout of the building presented and on a number of places on the layout are camera icons placed. See figure 1. By clicking on any of them is it possible to see a video from the specific part of the factory. Together with most of the videos are also written information attached telling about the work station. Also videos from the surroundings, entrance and office, changing-room and lunch room can be studied. Totally are 18 such videos included with a total length of more than one hour.

After the "tour" outside and inside the company has the visitor a very clear picture of how it looks, which machines etc that are used and what is made on all work places. It is now possible to sit down and study a very comprehensive material. The PPA-report (18 pages) includes a lot of information with the aim to make the companies "real" productivity potential clear. The presented report is based on an exhaustive study on the company that has served as model for the "virtual". The result from the WEST study on the model company is also presented in a report (4 pages). In the report are the relative risks for accidents and strain injuries as well as noise level and an estimate of general working conditions reported. The visitor can also look at seven videos visualizing a few welders exposure to welding smoke. The PIMEX method was used for this purpose. Finally can the visitor listen to video recorded interviews with one of the welders in the company, the safety representative and

the MD. In the interviews are they telling about how work environment management is organised in the company and are also giving their view about risk factors etc.

Use of the virtual company in university courses

The material building up the virtual company is as described very comprehensive. It gives thereby a lot of possibilities for use in courses where a real study visit to a company would be preferable but of practical and economical reasons not possible to carry through. On the same webpage as the virtual company is placed has also four sets of work tasks been proposed for use together with the material. Work task 1 is placing the student in the role of the MD of the company. The labour inspection has announced that they will come for an inspection soon and the task for the student is to prepare for that visit. Which laws are applicable? Which are the most important risk factors? What is needed/possible to do to improve the situation?

Work task 2 and 3 is placing the student in the role of the HR manager. The questions directed to the student are focusing on the relations to the union, information and negotiations. In work task 3 has the MD decided that all staff shall be medically examined with an aim to reduce risks at the company. The HR manager is supposed to propose how this can be carried through considering laws and relations to the staff. In task 4 is the student supposed to especially carefully study the PPA report and propose changes in the production based on this report.

Until the end of 2011 have in total 132 students at Dalarna University visited and produced reports from the virtual company. All of them have been given work task 1 as above and their specific task was to write a report presenting an overview of applicable legislation as well as to present and discuss three selected risk factors in the company. When the work task has been presented has also recommendations about web sources on legislations etc been proposed. The time frame for their work has varied but has typically been a few weeks from that the work task was given out till deadline for a report. In all cases has seminars been arranged with groups of around five students where the report has been presented and discussed.

Evaluation

Experiences from the use of the virtual company have been evaluated in two ways. The first evaluation was made as a special project after the first test and has been reported separately (Emmoth, 2009). The evaluation was made by interviewing 11 students following the program Industrial Development and Leadership where the use of the virtual company was one part of the course "Industrial Work-environment". In the evaluation report was it concluded that the technology for visiting the virtual company was working impeccable with a few exceptions. It was e.g. proposed that the students should be given access to headphones if they were doing their work amongst others at the university.

Seven of the interviewed expressed that they should have needed more information about the different work places in the company. It

was proposed that additional videos should be added where a speaker was telling a little more about machines etc. It was also proposed that a video with a walk through the whole company should be added.

The views about whether it was easy to find the information needed was varying. Some of them proposed that more time should be given for introduction to the material when the task was presented. Ono lecture hour was used for that purpose. It was proposed by the evaluator that a special video with a presentation of the "virtual company" should be added.

Two main advantages where mentioned by the students, the flexibility which also lead to that they could use their time more effectively. It was also pointed out the advantage that it was possible to go back and repeat as much as they like. The most important disadvantage was that they thought that the information about the company not was sufficient.

As a final conclusion the author pointed out that: the contents of the training material must be interesting enough to keep up the motivation to proceed and that the information must be sufficient to make it possible to apply theories. To meet those demands is, according to the author, improvements needed that are possible to make.

As in all other courses are all students supposed to fill in a course evaluation form. The answers from 68 of the students tells that many but not all are satisfied with the part of the course when they visited the virtual company. They were asked to grade this part on a scale of five ranging from very dissatisfied till very satisfied. The judgment was made concerning professional contents and the pedagogic. The full scale was used but only three respective four of them gave the lowest grade. Around 50% of them gave grade 4 or 5 meaning that they where quit or very satisfied. A few positive comments were also given around the experiences from the visit to the virtual company.

Discussion and proposals for development

A virtual company as in this case can definitely serve as a complement or alternative to real study visits to workplaces in courses where it is important to relate and apply the theoretical part of the course to the reality. One of the biggest advantages is that students may visit the virtual company at any time and make re-visits as many times as desired. Even if this example now has been used by more than 100 students in different programs can a lot of possible improvements as well as possibilities to widen the use be identified. To produce a material like this requires resources for planning, video recording, writing of texts, production of web pages etc. This implies that an economically quit high threshold must be passed to realize a production. Resources must probably also be reserved for adjustments and updating of the material. This investment shall be put in relation to the possibilities to arrange study visits and to allow the students to take time and study the situations in details.

The experiences from this project calls for a continued development and further evaluation of the material. The base of the material is videos from and information in text about almost all workplaces, interviews with a few key persons and reports from analysis concerning productivity and work

environment. The comments given by the students who have worked with the virtual company indicates that further and more detailed information is desired. This kind of information can be produced by going back to the same company which served as the model for the virtual. It can also be made by adding material and information that for sure not is true in the model company but very well can be realistic in the virtual company. This makes it possible to gradually build out the virtual company and also to widen the topic from having a main focus on work environment. Such a development should make it possible to extend the use to a number of applications in other courses and study programmes. The probably best way to do so is to stepwise involve lecturers in other topics in a development of the virtual factory.

To make the material more "living" have the PIMEX method been used to visualize welders exposure to fumes in their work. In the now existing version are such visualizations limited. To further improve the material is a development of such or similar visualizations desired. By using PIMEX can adding of visualisations of other work environment factors as noise, vibration, muscle load etc. be a good idea. Visualizations with the help of different methods would definitely improve the

quality and counteract the risk that the visit will be experienced as boring.

References

Almström P, Kinnander A. (2007). Productivity Potential Assessment of the Swedish Manufacturing Industry, Presented at the 1st Swedish Production Symposium, Göteborg, August 2007.

Bengtsson G, Berglund R (1997). WEST. En metod att mäta arbetsmiljö (WEST. A method to measure work environment) IVF-skrift 97836, Industriforskning och utveckling AB (Industrial Research and Development Corporation), Mölndal, Sweden.

Emmoth A (2009). Arbetsplatsen till klassrummet – en utvärdering. Arbetsrapport 2009:4. Dalarna University.

Dalarna University (2007). www.du.se/arbetsplatsentillklassrummet.

Rosén G, Andersson I-M, Walsh P T, Clark R D R, Säämänen A, Heinonen K, Riipinen H, Pääkkönen R (2005). A review of video exposure monitoring as an occupational hygiene tool. Ann. occup. Hyg., Vol. 49, No. 3.