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ARTICLE

Application on Mobile Learning by Video Manual: A Study of HRD from Bicycle Manufacturing

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Abstract
Video messages are easier to receive than text messages because of the lack of language and text barriers. In the past, when on-the-job training for junior employees were conducted in the manufacturing industry, they often carried out technical training with "mentorship system" or "work manual". This study aims at how video makes effects to those who work in manufacturing industries, especially those from other countries. Migrant workers from abroad or companies with manufacturing plants overseas have gradually used video manual as teaching materials for enterprise education and training, especially when COVID-19 becomes a global epidemic crisis. This study used in-depth interview research methods to investigate both workers and managers in the same manufacturing industry. The results found that when using digital cameras to record and edit, the production line equipment can achieve the following effects: (1) Promoting junior workers' self-efficacy; (2) Use of different language translations can provide simultaneous education and training for workers from multiple countries; (3) Putting digital teaching materials on cloud will make employees to use digital mobile vehicles to download and learn, that can save more time for employees.

Keywords Video handbook · Mobile learning · Human resource development · Self-effectiveness

1 Introduction

Since the end of World War II, digital videos have been constantly affecting the human society. In recent years, because of the rising of cultural and creative industries, film and television production began to be a "tool" character, which means film and television workers work so hard to chase "ratings" or "box office" began

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to take the role of "description", "advertising propaganda" and "education". In the "promotion" and "advertising" sections, with the popularity of television, advertising video had become a mature industry, and with the promotion of information communication technology (ICTs), the role of advertising gradually became "short films" and "micro-films", etc. Its main function is still to promote and persuade. Digital video, with special effects, music and animation had become kind of manual or textbooks, especially when multi-media education materials have been applied to schools and subjects at all levels. So, even digital video had become the ingredient of video games [16].

In the application of multimedia, the high level of "readability" and "interactivity" had let it become popular educational material in the early childhood and primary education section. Just because young children cannot concentrate for a long time in learning, so the application of highly interactive teaching materials grabbed young children's attention because this kind of material can easily attract children while learning [9, 13]. On the other side, video and multimedia teaching materials use lots of animation, so it can present other special contents than normal videos. Normal video cannot present perspective, simulation feelings. So in engineering, chemistry or biomedical subjects and other phenomena that can be observed by naked eyes can be made into teaching materials. Then, the learners can learn it with imagination and have more learning effects easier [24].

Over the past decade, technology has added many different elements to human resources management and development [19]. The use of digital means of human resources development has gradually begun [2]. In 2020, COVID-19 epidemic went around the world,many cities began to lock down, these places that got locked down include public places, shops and stores, mass transportation vehicle and other places. Mostly, educational institutions are on the lock-down list. Many schools try hard to keep students' social distance in classrooms, and in some countries or regions where the outbreak is more severe, those government authorities have even replaced daily instruction with tele-video [15, 18]. The message from the campus lock-down can be found that people are highly wary of close group contact, and the same problem is still to be faced in manufacturing industry. Many business meetings and visits are gradually replaced by tele-video, so that if education and training can be conducted in a different "non-traditional way" than face-to-face teaching, so that enterprises' education and training will not have bad influence by the epidemic.

This study takes digital video as "teaching materials" as the main variable and attempts to understand how to use video teaching materials in the manufacturing industry to promote "action learning" and enhance the effectiveness of on-the-job education and training of employees, and also to understand the changes in self-efficacy of employees receiving in the education and training.

2 Literature Review

This study aims at the mobile learning effects of using digital video teaching materials for learners in the manufacturing industry. Similar to the science and engineering-related courses, a part of the manufacturing process is not visible, so the use of

digital video teaching materials can make learners to understand the making process and have high value of self-efficacy. In addition, because the manufacturing process is simplified, so often that the managers of factories do not think too much that education and training is necessary. So using digital video materials to have training is relatively rare in the field of manufacturing industry. But in the era of artificial intelligence, enterprises need to face the transformation and changing opportunities gradually increased. So this study attempts to start digital video teaching materials engaged in education and training. Then, the enterprises should understand the types of video training materials for enterprises will bring about some changes.

There are many studies focusing on the education and training of employees in the manufacturing industry at the primary level. They focused on the correlation between corporate ethics and ethics and quality [10, 11]. Some studies have also aimed at the types of manufacturing industries that often require enterprise education and training [1], which is based on the macro perspective of enterprises to understand the effectiveness of their education and training. But these studies lack the personal views of training. Moreover, the vigorous development of mobile devices and vehicles in recent years has caused many enterprises to focus on the use of different traditional methods of education and training. So this study explores the relevant documents of the manufacturing industry, and the use of "video teaching materials" as the main factors to understand the use of mobile devices in "mobile education" in the manufacturing industry, and show the kind of change in educational benefits and employee's self-efficacy.

The keywords described in this article are defined as below:

Video handbooks: Material that be used in class for students. They made from cameras or editing software, such as microfilms or those in Taiwan, it includes radio, television, film, visual arts and communication, architecture and life design, a total of 15 and 1 kind of business.

Mobile learning:

Human resources management: Generally refers to the use of old spaces to engage in all above-mentioned cultural and creative activities.

Self-effectiveness: relationships that are linked to the outside world by individuals or organizations.

2.1 Self-Efficacy

The concept of "self-efficacy" was introduced in the 1970s [3]. The main meaning is "whether one can use his or her ability to believe that himself/herself can do something and achieve one's goals". Although many studies believe that self-efficacy can come from personality traits [7]. But some studies still suggest that self-efficacy can come from several sources, including "experiences of success", "inspiration from others' success", "being inspired by others", and "maintaining self-physical and mental health", which can be applied in a wide range of fields, including education and personnel management systems [22].

Self-efficacy mainly focuses on educated people going through teaching materials, practical exercises and other learning process. When mentioning about work

problems and challenges, according to their own knowledge and skills, they can solve problems one by one, and complete the required work. Part of the research on the evolution of self-efficacy in education comes from students' learning effectiveness, especially in science-related education [6], and even studies that extend up to teachers understanding the relationship between teachers' self-efficacy and educational work [14, 17].

In practice, many enterprises arrange on-the-job training to strengthen the professional ability and skills of workers. In the past, the training of these skills was often based on mentor or written paper-based teaching techniques. The main way to use experienced workers is as lecturers and pass on their skills to new staff to pass on knowledge and skills. In addition, to strengthen the reception of knowledge and skills, paper-based teaching materials will also be arranged for new staff for reading, knowledge management and inheritance within the organization. According to the study, in organizations with educational training, employees' self-efficacy is higher, mainly because of continuous learning, employees have a better chance of developing "creative thinking", "innovation ability" and "problem-solving ability". When there are difficulties or problems that need to be solved, they will also be better and able to solve problems [8, 20].

In response to information era, there have been different trends of teaching instead of "mentorship" and paper textbooks. The biggest change is that the paper textbooks had gradually been replaced by digital video materials, especially for younger audience. More learners can accept digital teaching materials just because paper textbooks are old-time things. This trend keeps learners from cross-cultural differences and "read" the "images" directly, and this is so-called "readability" [5]. Another trend is that "action learning" promotes the use of mobile devices to learn. People are no longer limited by a certain space or time when they are learning. Therefore, many mobile devices will be used to learn in digital education [12, 23].

Self-efficacy of digital and mobile devices in learning has been less discussed in past studies, so this study expects us to understand learners' self-efficacy results with digital content of video material.

2.2 Mobile Learning and Human Resources Development in Manufacturing

The concept of "action learning" comes from the advances in science and technology, so that learning activities are no longer limited to specific times and places. This way of learning can not only enhance interaction between each other, but also enhance the interaction when learning. This process can also be through the interaction of new technology to reduce the boring feelings of learners. Traditional learning methods are mainly by the way of face to face in the classrooms or teacher-directed teaching, the courses are not only difficult for students to choose, but also have less interaction in the classrooms. Therefore, through action learning, teachers can design more diverse teaching content and learning activities, and students can also adjust the speed of learning according to their own conditions. New forms of learning, whether in formal school classrooms or in-service training by enterprises, are becoming mainstream, especially as action learning can turn learning activities into

learner-directed, and it is close to the concept of "flipped classroom" [4, 21]. Learners' freedom to choose teaching materials, teachers and study time can affect learning results and self-learning results. In other words, action learning allows learning activities to be learner-directed, learners can control their own learning content and progress. Action learning also emphasizes the use of mobile devices for learning and other characteristics so that learning activities are not limited by space and time.

The core value of the enterprise is to have employees with talent, those people not only can create profits, but also enhance the enterprise's professional image outside. However, the enterprise's employees are busy with their work every day. So that they do not have enough time to study in a fixed space or time. Especially in the manufacturing sector, few companies are willing to encourage their employees to carry out "on-the-job training" and "self-learning". So when enterprises have to do something to upgrade or transform, they will have to face the fact that employees are not skilled. So at that time, the companies could have a negative impact. Therefore, knowledge and skills can be enriched in a more convenient way if employees are allowed to schedule their time more freely through "action learning".

2.3 Mobile Learning by Video Textbooks

Video content refers to the use of computer animation, audio and video, sound effects and music and other ways to present the content. Because of the lively and strong interaction by video content, so they have become a point on interactive education just like the use of teaching materials. It has been decades to use video teaching materials. These materials are not only widespread but also widely recognized, so that they are used both in educational and medical institutions. After the popularity of video content, mobile devices are another driving forces that bring about changes in action learning. Mobile devices generally refer to those information communication technologies (ICTs) with mobile characteristics. Using these tools can have a lot of transmission capabilities, but because of the lack of technology, they can only be placed on the transmission and delivery of information. After ICTs were paired with mobile networks, people began to think differently about ICTs as a ready-to-move "production devices". And therefore, ICTs were paired with mobile networks into "mobile classrooms", "mobile textbooks" and "mobile teachers". So not only is the classroom flipped, but the teaching materials are also as the same situation. After the gradual popularization of these mobile devices, many enterprises have switched to use "video or multimedia teaching materials" and use mobile devices as their learning tools. In this way, enterprises can not only reduce the cost of learning, but also bring more learning effectiveness to their employees. In terms of the internationalization of enterprises, many enterprises' production and manufacturing and administrative geographical location are not necessarily consistent. Especially at present, many manufacturing industries have turned their production and manufacturing locations to countries or regions with lower labor costs. Using images and image-based video teaching materials for education and training, not only can reduce the cross-cultural difficulties and language barriers, but also have the benefit of cost-reducing no matter time or money.

Based on this, this study, using "video and multimedia audio-visual teaching materials" as the main research material, attempts to understand the differences between educational and training effectiveness of the current staff in the case in using the past "paper textbooks" and "online multimedia teaching materials".

The issues that this study intends to explore include the following:

(1) New ways of training can have positive self-efficacy on the new-comers.
(2) Foreign workers can have more efficiency of learning using multi-media educational materials.
(3) Use of mobile devices to learn can enhance the willingness of workers to ability. Social networks have effects on the contents they post on social media platform.

3 Research Methods

This study aims at manufacturing company as a case. This company had been held for over four decades. To know how employees think about video textbooks, this study interviewed 9 respondents in this company. This study puts all respondents in three categories. First, this study interviewed 3 managers, all of them have been there for over 10 years. As they have enough time to get through all the changes in a decade, they could tell the difference between old and new educational materials. Second, this study interviewed three other respondents. They came from real production divisions. Depending on them, this study can tell us the change of employees' self-efficacy. Finally, this study also interviewed other three employees who came from other countries. These foreign workers can tell us textbooks with English translation is harder or easier than multi-media educational materials. This study used a pre-developed open interview outline to conduct in-depth interviews with nine young respondents. When finished with all interviews, the data can be coded and analyzed, then the following conclusions can be drawn.

4 Results

This study provides explanations for the three points of "the advantage of video or multi-media handbooks", including "junior staff's self-efficacy", "the difference between translation handbooks and multi-media educational materials" and "social effects in the field" and "the effect of digital education materials to employees".

4.1 Boost Employees' Self-Efficacy

First, junior workers are the crew that needs to get more knowledge and skills in the enterprise. Because there is a certain amount of on-the-job training to produce products that meet the quality requirements and play the production benefits required by the enterprise, this study interviewed three new employees and they are under 6 months of seniority in the enterprise. These employees are well aware that the use

of new educational materials can make it easier for them to learn, so that learning outcomes can give them more confidence to face all the challenges at work.

… If I've used that kind of statement, I'm afraid that I haven't really been able to understand what's really going in the statement. (Respondent E).
... I'm not good to connect with other people. So if I'm using mentorship to have on-the-job learning, I might be afraid to communicate my own problems, so that it could be much less effective. The current method of learning is probably the best way for me. (Respondent D).
... This kind of teaching material is very helpful to me, because I am an office worker who has family and kids. So, I do not have to arrange my own time to go outside just for our classes. (Respondent F)....

From the interview above, this study can found that junior employee respondents like the new way of education, because they can find space and time for themselves, and that could enhance their self-efficacy. Especially in the part of time, the increase in freedom is one of the important factors of overall success.

… I think this kind of study will work just mainly because our time is loosened. In the past, to participate in on-the-job training make family time hindered. Now, the action learning lets everyone have more room to arrange other activities, we no longer need to work overtime because of the on-the-job classes! (Respondent F.)

It can be known that the freedom of timing has become the most important reason for high evaluation of employees in action learning.

4.2 Training with Other Braches Abroad

This study attempts to understand the effectiveness of the education and training conducted in the use of video teaching materials in the manufacturing industry, where there are many expertise and even some enterprises will need to set up factories overseas. To this end, this study found three foreign workers to conduct in-depth interviews, the results of the interview found that foreign workers believe that in the past, the use of translated text materials or manuals, obviously need to spend more time to read. But if learners watch video content, there would be more learning efficiency. In addition, the use of video is easier to explain, and could have the live experience when learning.

...the translation text is professional and it sometimes difficult to understand. Because the quality of translation is not always in good situation. If I cannot understand the content, it will make us hard to know the knowledge in manuals. (Respondent H).
... Honestly, I am not good in reading, even those words are not hard, it is also possible for me to mix the meaning in manuals. So, I've had read it for many times, and I've had the dilemma of using it when I have to use the skills on the production line. (Respondent I).

...It's not just about the ability of reading, video material have pictures, so that foreign workers could keep them in memory more quickly. And then, foreign workers are able to understand the teaching material and we can operate at the time easier to use. (Respondent G)....

Therefore, it could be found that digital video teaching materials are easier for learners to understand than text-based teaching materials. But this study also found that the characteristics of the teaching materials, as well as the use of special effects or sounds, it is easier for learners to focus on main point of reaching material.

4.3 Promote Motivation of Learning

Digital video manuals may have been played and watched as fixed devices in the past, but with advances in technology and the use of information communication technologies (ICTS), it is now possible to break the time and space constraints, as long as learners use the mobile devices. It can bring different learning effects, for production managers also reduce the cost of education and training. This study interviewed three people that are heads of case companies. They belong to different production departments, and this study asked them to explain the advantages and disadvantages of digital video teaching materials. The respondents were highly positive about digital video materials, including the benefits of time, finance, and knowledge management for the enterprise.

... In order to run the education in enterprise, the workers have to stop their work to join the classes. Or the production line should stop for it. As a matter of fact, that could take much of time. Time is money for all the enterprises. And then there's probably only a few workers who can do that at a time. When we finish this class, we will have to spend the time again for next classes, so it costs so much. If we use a video manuals to teach, that should not be cost so much. (Respondent B).

... The most important thing for businesses is the management of knowledge. Knowledge should likely to be rebuilt because of some people's problems, or employees leave the companies. If we use video manuals to teach, we'll not afraid of knowledge will disappear just because somebody leave their company. (Respondent A).

...The most important thing that I think is if the company puts all these materials on the cloud, overseas branches can see the update of the teaching materials very quickly. Then it could save much of the time for enterprise, because these changes will be in time. That way could save lots of time for the enterprise. So that we will not be afraid of changes caused by the enterprise's changing (Respondent C).

Interviews from the above can find that manager focuses on the way of training that can reduce the cost of time. So digital video manuals are one of the popular kinds of teaching materials. And if the material can be uploaded on the cloud, then the enterprises can have more efficiency because it can be used by overseas factories.

5 Conclusion

This study found that the use of digital video teaching materials in the manufacturing industry for education and training can get a variety of benefits, including the following three: (1) to promote new employees to get more self-efficacy. Interview results found that digital video teaching materials can be more quickly completed the function of education and training, and so that employees in the face of difficulties and problems on the production line, they can have a higher level of confidence to solve the problem. (2) The simultaneous education and training of workers in many countries can be carried out using different text translations. Interview results found that multinational foreign workers in the past use the translation manuals often have a high degree of doubt, coupled with individual differences in reading ability, translation paper manuals are not easy to understand, so they are not easy to achieve comprehensive educational and training results. So the use of digital video teaching materials can not only solve the problems, but also use images, music and special effects to make learners can easily remember the point of education and training. (3) Put digital video teaching materials directly in the cloud, let employees use digital mobile devices to download and watch the video and this can enhance staff self-learning. This can let management save education and training costs. Using the cloud to turn digital teaching materials into ready-to-view downloaded content has real-time benefits for multinational enterprises, especially when enterprises face frequent and significant changes. Such teaching materials can quickly allow employees to complete education and training which can also reduce the risk and cost of change.

Education and training materials in the manufacturing industry are not limited to instructions for use, others including daily maintenance and troubleshooting have relevant instructions. However, the daily maintenance of the movement is more complex. Equipment repair is not required every day. Therefore, the function of repair video is not in the scope of discussion in this study. In addition, this study did not discuss the special effects, sound and music materials used in digital video teaching materials in the interview. Such content should also be part of the digital video teaching materials, future research can explore such factors to fully understand the impact of digital video teaching materials on the manufacturing industry.

References

1. Abele, E., Metternich, J., Tisch, M., Chryssolouris, G., Sihn, W., ElMaraghy, H., & Ranz, F. (2015). Learning factories for research, education, and training. *Procedia CiRp, 32*, 1–6.
2. Athithya, E., Kavitha, A. C., & Muralidhar, S. (2020). Electronic-human resource development (e-HRD): A case study of CVRDE. *DESIDOC Journal of Library and Information Technology*, *40*(4), 197–203
3. Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191.
4. Bishop, J. L., & Verleger, M. A. (2013). The flipped classroom: A survey of the research. *ASEE National Conference Proceedings, 30*(9), 1–18.

5. Bormuth, J. R. (1966). Readability: A new approach. *Reading Research Quarterly, 1*, 79–132.
6. Britner, S. L., & Pajares, F. (2006). Sources of science self-efficacy beliefs of middle school students. *Journal of Research in Science Teaching, 43*(5), 485–499.
7. Caprara, G. V., Vecchione, M., Alessandri, G., Gerbino, M., & Barbaranelli, C. (2011). The contribution of personality traits and self-efficacy beliefs to academic achievement: A longitudinal study. *British Journal of Educational Psychology, 81*(1), 78–96.
8. Chiaburu, D. S., & Lindsay, D. R. (2008). Can do or will do? The importance of self-efficacy and instrumentality for training transfer. *Human Resource Development International, 11*(2), 199–206.
9. Clark, R. C., & Mayer, R. E. (2016). *E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning*. . John Wiley & Sons.
10. Gibb, A. A. (1987). Enterprise culture—its meaning and implications for education and training. *Journal of European Industrial Training, 11*, 2–38.
11. Kaptein, M., & Van Dalen, J. (2000). The empirical assessment of corporate ethics: A case study. *Journal of Business Ethics*, *24*(2), 95–114.
12. Korucu, A. T., & Alkan, A. (2011). Differences between m-learning (mobile learning) and e-learning, basic terminology and usage of m-learning in education. *Procedia-Social and Behavioral Sciences, 15*, 1925–1930.
13. Mayer, R. E. (2002). Multimedia learning. *Psychology of learning and motivation.* (pp. 85–139). Academic Press.
14. Palmer, D. H. (2006). Sources of self-efficacy in a science methods course for primary teacher education students. *Research in Science Education, 36*(4), 337–353.
15. Pollom, E., Sandhu, N., Frank, J., Miller, J., Obeid, J. P., Kastelowitz, N., & Gibbs, I. (2020). Continuing medical student education during the COVID19 pandemic: Development of a virtual radiation oncology clerkship. *Advances in Radiation Oncology*, *5*, 732–736.
16. Rogers, S. (2014). *Level Up! The guide to great video game design*. . John Wiley & Sons.
17. Roberts, J. K., Henson, R. K., Tharp, B. Z., & Moreno, N. P. (2001). An examination of change in teacher self-efficacy beliefs in science education based on the duration of inservice activities. *Journal of Science Teacher Education, 12*(3), 199–213.
18. Scull, J., Phillips, M., Sharma, U., & Garnier, K. (2020). Innovations in teacher education at the time of COVID19: An Australian perspective. *Journal of Education for Teaching, 46*(4), 497–506.
19. Stone, D. L., & Dulebohn, J. H. (2013). Emerging issues in theory and research on electronic human resource management (eHRM). *Human Resource Review, 23*(1), 1–5.
20. Tannenbaum, S. I., Mathieu, J. E., Salas, E., & Cannon-Bowers, J. A. (1991). Meeting trainees' expectations: The influence of training fulfillment on the development of commitment, self-efficacy, and motivation. *Journal of Applied Psychology, 76*(6), 759.
21. Tucker, B. (2012). The flipped classroom. *Education Next, 12*(1), 82–83.
22. Umrani, W. A., Siyal, I. A., Ahmed, U., Arain, G. A., Sayed, H., & Umrani, S. (2019). Does family come first? Family motivation-individual's OCB assessment via self-efficacy. *Personnel Review, 49*, 1287–1308.
23. Vinu, P. V., Sherimon, P. C., & Krishnan, R. (2011). Towards pervasive mobile learning–the vision of 21st century. *Procedia-Social and Behavioral Sciences, 15*, 3067–3073.
24. Wilson, E. A., Makoul, G., Bojarski, E. A., Bailey, S. C., Waite, K. R., Rapp, D. N., & Wolf, M. S. (2012). Comparative analysis of print and multimedia health materials: a review of the literature. *Patient Education and Counseling, 89*(1), 7–14.