
Edupreneur: Developing Boardgame As a product of University Entrepreneurial Activities

Wustari L. Mangundjaya*, Seta A. Wicaksana

Faculty of Psychology, Universitas Bhayangkara Jaya, Faculty of Psychology Pancasila University

wustari.larasati@dsn.ubharajaya.ac.id, seta.wicaksana@univpancasila.ac.id

ABSTRACT

Purpose: This paper will discuss the effectiveness of board games as an educational tool in people's development and the possibility of boardgame as a university product. Developing a board game as an alternative to entrepreneurship products was explored as a stimulating learning program, especially for the adult learning program. People need to gain more competencies to be accelerating with the current condition and compete in this era, as competencies are essential, so people must acquire and learn new competencies. Meanwhile, learning is not a one-way round; it is a complex process that needs to emerge within themself. Board games are instruments that can help people learn new competencies and enhance people capacity, with fun and enjoyable way.

Design/methodology/approach: This study uses quantitative research with 70 respondents consist of 60 respondents as the participant of boardgame and 10 lecturers.

Findings: Board games could be a learning method that is fun, challenging, and engaging for participants. Board games are great tools to be used as they follow the andragogy assumptions, hence positively impacting learning. This study aims to give scientific studies on the use of board games in human development settings. As well as the opportunity of the University to develop the edupreneurship within their university.

Research limitations/implications: First, this study only conducted at the participants from one holding company that participates in the training program. Further study with larger participants and from various companies is recommended. Second, this study only uses simple descriptive analysis from the participant's evaluation and lecturer's opinion, different types of data collection tools might be used in the further study.

Practical implications: The study also showed that universities should take part in developing entrepreneurship activities by supporting them. The study also revealed that boardgame could become one of the products from the University, especially from the Faculty of Psychology.

Originality/value: Exploring the board games as a learning method that is fun, challenging, and engaging for participants., as well as the possibility of earning income for the lecturers, students and lecturers.

Paper type: Research Paper

Keyword: Board Games, Entrepreneurship, Human Development, Learning, University.

Received : March 4th

Revised : March 12th

Published : March 31th

I. INTRODUCTION

Research has shown that entrepreneurship, small businesses, and start-ups affect the economy of the country. Kritikos (2014) also found that entrepreneurship positively impacts economic growth by introducing innovative technologies, products, and services and raising firms' and economies' productivity. This phenomenon also happens in Indonesia, as shown during the economic crisis in 1997-1998: the companies that survived and even contributed to the economic condition are small businesses and start-ups. Meanwhile, according to recent statistics (BPS Indonesia, 2016), Indonesia has only about 8 (eight) million entrepreneurs, equal to 3.1% of the total population, reaching 267 million people. These numbers are still low compared to neighboring countries in the Asian region.

In response to this condition, Indonesia's government has been implementing several policies to increase Indonesian entrepreneurs. Some of the policies are as follows: First, providing economic incentives for new ventures, providing soft loans. Second, delivering training on entrepreneurship, conducting all kinds of entrepreneurial development programs. Third, conducting a coaching clinic to enhance the intention, knowledge, skills, and abilities of the people to become entrepreneurs (Mangundjaya et al., 2015). Moreover, Indonesia's government also realized and recognized that the University and campus also play a significant role in developing entrepreneurship. They develop many programs to speed up a more active role of universities in getting more entrepreneurs from the universities, such as: providing many grants for research, coaching clinic, project simulation or incubation, and many other programs about entrepreneurship. This involvement of universities is vital, given that this career avenue is becoming a more common and necessary choice for first Previous researchers have conducted studies on the topic of the entrepreneurial intention of university students (Jean-Pierre & Emin, 2006; Mangundjaya, 2012; Mangundjaya et al., 2015). According to Hisrich et al. (2010), entrepreneurship creates and develops something new with value. Meanwhile, Industry 4.0 marked using the internet of things (IoT), cyber-physical item (CPS), information and communication technology (ICT), and enterprise architecture (EA) (Lu, 2017; Qin et al., 2016). People live in an ecosystem where technology is anywhere through the interaction and integration between humans, machines, and the internet (Liao et al., 2017; Vaidya et al., 2018). It is all to make better productivity and efficiency (Lu, 2017). This new framework results in changes in many aspects of life, such as social, economic, and political situations (Lasi et al., 2014). It also affects the changing of demands in human activities and tasks (Gorecky et al., 2014). People need to adapt to make the best use of Industry 4.0 potentials (Schmidt et al., 2015).

Due to the advancement of technology, machines are no longer operated by people, so it causes technological unemployment, including job profiles alteration, which leads to the need to adjust education and human development areas (Benešová & Tupa, 2017; Bonekamp & Sure, 2015; Hecklau et al., 2016; Roblek et al., 2016; Shamim et al., 2016). People need to turn themselves into long-life learners and continuously develop new skills in filling the current demand (Zhou et al., 2015). Four competencies domain, social competencies, methodological competencies, personal competencies, and technical competencies were switching due to Industry 4.0 enactment (Hecklau et al., 2016). Some of the essential competencies to complement this era are innovation capability (Lasi et al., 2014), coordination, creativity, analytical skills, flexibility, networking skills, communication skills (Hecklau et al., 2016), higher-order thinking (Ras et al., 2017), strategic decision-making, and flexible problem-solving (Gorecky et al., 2014). People also need to acquire new knowledge and skills through learning and development (Henschke, 2016). Unlike children, adult learning is no longer guided and fed by a teacher. Adult learning, which is often called andragogy, is symbolized by self-directing, self-motivating, and problem-centered characteristics (Bryan et al., 2017; Rothwell, 2008). Using andragogy principles will benefit the learning process as adults bring their own experiences and bridge the cognitive, affective, and behavioral aspects (Hagen & Park, 2016; MacKeracher, 2004). Some of the techniques used in adult learning are role playing, group discussion, service learning, and problem-based learning (Forrest & Peterson, 2017). Unfortunately, some of the adult learning did not successfully help them acquire new knowledge or skills as the learning method, and the condition is not facilitating them too (Koster, 2013; Rothwell, 2008). Therefore, there is an urge to use another exciting and fun learning method that can help an adult in gaining capabilities (Fullerton, 2015).

A. Entrepreneurship in University

Entrepreneurship is the process of creating and developing something new with value. This process starts by devoting the necessary time and effort, accompanying financial, psychic, social risks, and lastly, receiving the resulting rewards of monetary and personal satisfaction from this process (Hisrich et al., 2010). In other words, an entrepreneur should have the ability to create something new. Meanwhile, concerning developing entrepreneurial mindsets and campus skills, universities should provide their students with the education and support them to make an entrepreneurial career easier to undertake. In this regard, university management should provide their students with the opportunity to practice entrepreneurship activities, also including encouraging students to engage in entrepreneurial activities include as part of the curriculum. These activities will enhance their self-efficacy and provide them with real experiences being as an entrepreneur. Moreover, university management should develop a curriculum covering entrepreneurship skills, such as business plan and conduct entrepreneurship clubs, start-up internships, and the likes to nurture and promote innovation and entrepreneurship.

Working hard towards a degree during the college years will pay off in entering the good corporate world. However, many people find entrepreneurship as a more rewarding career path (Mangundjaya, 2012). Being an entrepreneur for some people can branch out and create something of their potential. For many college students, experiencing as a student entrepreneur will develop themselves. They enable learning a lot from this experience.

Meanwhile, to accelerate entrepreneurial activities on campus, the students and lecturers must master entrepreneurial mindsets and skills. In this regard, the lecturer and students are hand-in-hand in creating a product based on their knowledge and skills. Faculty members (lecturers) are the ones that have the knowledge and concepts, and even the skills in making the product. Students, especially the Master (Postgraduate) program, have fresh ideas, critical thinking, innovation, and creativity, which will make the right combination and result in new innovative products and services.

There are many advantages to developing entrepreneurship on the campus for the students, faculty members, administration staff, and the University. In general, being an entrepreneur on campus may gain some benefits. First, there are information and facilities that are available to be used. Second, networking is secure. Third, more comfortable to advertise. Fourth, there is full support from the university and government (the supports are in terms of the grant, facilities, expertise, policies, and other types of support). Moreover, the administration staff can be involved in the program as well. Further, it may create a good relationship between students and faculty members with the entrepreneurship program activities. From the university point, the benefits of entrepreneurship for the University itself will also bring some funds and the popularity of the University, especially if the product or service is excellent.

B. Boardgame and Gamification

According to Kapp (2012), gamification uses game-based thinking, mechanics, and aesthetics to engage people, motivate action, promote learning, and solve problems (Kapp, 2012). This definition incorporates many important pedagogical components. First, gamification is to promote learning. Second, gamification refers to game dynamics focused on game elements that allow for social interaction between players. Third, gamification will develop motivation and engagement. The fourth definition is the emphasis on critical thinking skills (Kapp, 2012). Based on this definition, it may conclude that board games, as one of the gamification methods, are suitable for promoting learning and people development activities. The characteristics of playing a board game that is fun, challenging, dynamics, and allows for high social interaction and teamwork between players are some of the advantages of board games. Thus, gamification techniques positively impact the learning program.

People need to gain new knowledge and skills through learning and development (Henschke, 2016). Adult learning is no longer guided and fed by a teacher. Adult learning, which is often called andragogy, is symbolized by self-directing, self-motivating, and problem-centered characteristics (Rothwell, 2008). In this regard, using andragogy principles will benefit the learning process as adults bring their own experiences and could bridge the cognitive, affective, and behavioral aspects (Hagen & Park, 2016; MacKeracher, 2004). Some of the methods used in adult learning are role-playing, group discussion, service learning, and problem-based learning (Forrest & Peterson, 2017). Unfortunately, some adult learning programs did not successfully help them acquire new knowledge or skills as the learning method and condition does not facilitate them (Rothwell, 2008). Therefore, there is an urge to use another new and fun learning method to help an adult gain capability (Fullerton, 2015).

There are some benefits of gamification as follows: a) Better learning experience. By playing a board game, the learner can experience fun and excitement during the game and create a high engagement; b) a better learning environment. Gamification provides an informal learning environment, helping learners practice real-life situations; c) Instant feedback. Gamification provides instant feedback; thus, learners know what they know or what they should know; d) Prompting behavioral change. Gamification can drive significant behavioral change, especially when combined with the scientific principles of repeated retrieval and spaced repetition; e) It can apply to most learning needs. Gamification enables one to fulfill most learning needs, such as soft skills, business plans, teamwork, problem-solving, decision making, customer support, communication, and other needs. f) Gamification can also become engaging tools, and g) Engaging ways to convert ideas into projects. Further, the benefit of using board games in adult learning is enabling in increasing the transfer of knowledge and encouraging communication between participants (Mangundjaya, 2019; Treher, 2011)

Meanwhile, there are some limitations embedded in board games: a) a board game is not yet broadly accepted in the academic and corporate world. Board games are still not widely utilized in the learning process. Meanwhile, human development settings for more than a decade; b) still unknown to most of the target customers and users because people have not recognized its advantage; c) requires thorough communication and demonstration, as most boardgame is complicated (Treher, 2011). When using it requires clear and thorough communication and even demonstration before the game starts; and d) in some cases, it even requires the presence of a facilitator.

C. Boardgame as a university product

Entrepreneurship is the process of creating and developing something new with value (Hisrich et al., 2010). As a result, as the coordinator and facilitator of the entrepreneurship projects, faculty members should

create new ideas and new products or services that they want to make. Concerning the objectives of finding a suitable tool for adult learning, the choice goes to boardgame development. During boardgame development, some stages should be followed: The First stage is introduction and socialization about boardgame to the students; then, after the students understand the nature and characteristics of the board game. The second stage is determining the objective of the board game, with the underlying concepts and theories. The third stage is finding the board game model that will be the template to be observed, copied, modified, and introduced to the new model. The principle that always is in mind is the concept of edutainment (education and entertainment). The fourth stage is as follows; a) conducting try-out, b) collecting and analyzing the feedback from the try-out. The fifth stage is revising the board game based on the feedback. The sixth stage calculates the cost, and the last stage is planning and conducting advertising and marketing strategies. As it is understandable that boardgame is rather complicated, then it should be communicated clearly to prospective customers. In this case, marketing strategies should be aggressive and intense as boardgame is not widespread yet. Asking support from the university is also recommended as the university will provide both facilities or networks as needed.

II. METHODOLOGY

This research took place in 2019, with the data collection conducted first in one Hotel in Jakarta (for the participants from one holding group company consisting of various subsidiary companies who were participating in a management development training program conducted using many board games for different types of topics). After the board game session, the participants fill out the evaluation sheet form regarding the board game. There were 60 participants, with each batch consisting of 30 participants (N=60 participants). The second study was conducted with lecturers from the University of Indonesia (N=10) to identify their opinion about the university's possibility of supporting entrepreneurship activities and board games as one of the University's products for both studies, the participants have given a list of questions about board games. The second study was conducted with lecturers (N= 10) to identify their opinion about the university's possibility of supporting entrepreneurship activities and board games as one of the University's products. Data is analyzed using descriptive analysis. Data collection tools are shown in Tables 1 and 2 below.

A. Data Collection tools

Table 1. List of the questions (for participants)

No	Category	Questions	Answer		
			No	Neutral	Yes
	General	<i>Did you prepare for the game by reading the lecture notes?</i>	No	-	Yes
		<i>Did you deepen your knowledge with the board game?</i>	No	Neutral	Yes
		<i>Did the game increase your motivation for the class/topic?</i>	No	Neutral	Yes
		<i>Would you like to play board game again?</i>	No	-	Yes
	Playing the game	<i>Are the game rules clear?</i>	No	-	Yes
		<i>Did you have problems to understand the game instruction?</i>	No	Neutral	Yes
		<i>Did you have fun playing the game?</i>	No	-	Yes
		<i>Do you have enough time to finish the game?</i>	No	Neutral	Yes

	<i>Do you need the facilitator to assist you in understanding the game?</i>	No	-	Yes
<i>General</i>	<i>What did you like the best in the board game?</i>	<i>Open Answer</i>		
	<i>What is your feedback about the board games in general?</i>	<i>Open Answer</i>		

Table 2. List of the questions (for lecturers)

<i>No</i>	<i>Category</i>	<i>Questions</i>	<i>Answer</i>		
			<i>No</i>	<i>Neutral</i>	<i>Yes</i>
1.	<i>Edupreneur</i>	<i>Do you agree that university focus on entrepreneurship activities?</i>	No	Neutral	Yes
2.		<i>Do you agree that lecturers take part in entrepreneurship activities?</i>	No	Neutral	Yes
3.		<i>Do you think that University should facilitate and support the entrepreneurship activities?</i>	No	Neutral	Yes
4.	<i>Boardgame</i>	<i>Do you agree that Boardgame become one of the products of the university (faculty)</i>	No	Neutral	Yes
5.		<i>What are the reasons that Boardgame become one of the products of the Faculty of Psychology?</i>	<i>Open Answer</i>		

III. RESULTS AND DISCUSSION

Data is analysed using descriptive analysis. For both studies, the participants have given a list of questions about board games. The followings are the results of the study.

Table 3: Participant Responses

<i>No</i>	<i>Questions</i>	<i>Answer</i>		
		<i>No</i>	<i>Netral</i>	<i>Yes</i>
1	<i>Did you prepare for the game by reading the lecture notes?</i>	-	-	60 (100%)
2	<i>Did you deepen your knowledge with the board game?</i>	-	5 (8.33%)	55 (91.67%)
3	<i>Did the game increase your motivation for the class/topic?</i>	-	-	60 (100%)
4	<i>Would you like to play board game again?</i>	-	-	60 (100%)

5	<i>Are the game rules clear?</i>	10 (16.67%)	-	50 (83.33%)
6	<i>Did you have problems to understand the game instruction?</i>	10 (16.67%)	-	50 (83.33%)
7	<i>Did you have fun playing the game?</i>	-	-	60 (100%)
8	<i>Do you have enough time to finish the game?</i>	50 (83.33%)	5 (8.33%)	5 (8.33%)
9	<i>Do you need the facilitator to assist you in understanding the game?</i>	5 (8.33%)	-	55 (91.67%)

The results showed as follows:

1. It showed that most of the participants (83.33%) gain more knowledge with board games. They are all (100%) agree that board games in training increase their motivation on the topic discussed. They also want to use board games as a tool in their learning process (100%). The participants also feel that board games make the learning process more fun (100%). Meanwhile, they still need the facilitator to explain the game, as 16.67% of the participants mentioned that the game rules were not clear enough, and 8.33% mentioned that they needed more time to finish the game. To conclude, in general, participants enjoy and love training that utilizes board games. However, the instruction of board games is more complicated than other training methods; they still need more time and assistance from facilitators to digest the instruction more thoroughly.
2. The results for open question number 10, showed that most participants like the challenging parts of the game. They also like the opportunity offered by board games that enable them to solve problems. They also mentioned that the board game enhanced their critical thinking and developed their teamwork skills. The participants enjoy the board games very much, and through board games, the participants can master the consent of training quicker and better.
3. Results for question number 11 regarding the information about board games, participants were asked their feedback about the experience of playing a board game. From the 60 participants' feedback on the experience of playing the board game as follows: a) Exciting (66.67%), b) Fun, playful, and very entertaining (22.22%), b) challenging (7.41%), and c) they liked it a lot (3.70%). Furthermore, the participants also mentioned that board games have some benefits as follows: a) developing teamwork (34.19%), b) establishing good strategy (21.37%), c) developing good communication skills (16.24%), d) coordination (11.12%), e) problem solving and decision making (11.96%), f) dynamic interaction with the other players (4.27%), and g) enabling creative thought (0.85%).

Table 4. Lecturer's responses

No	Category	Questions	Answer		
			No	Neutral	Yes
1.	<i>Edupreneur</i>	<i>Do you agree that university focus on entrepreneurship activities?</i>	-	-	10 (100%)
2.		<i>Do you agree that lecturers take part in entrepreneurship activities?</i>	-	2 (20%)	8 (80%)
3.		<i>Do you think that</i>	-	-	10

		<i>University should facilitate and support the entrepreneurship activities?</i>			(100%)
4.	<i>Boardgame</i>	<i>Do you agree that Boardgame become one of the products of the university (faculty)</i>	-	2	8 (20%) (80%)
5.		<i>What are the reasons that Boardgame become one of the products of the Faculty of Psychology?</i>			<i>Open Answer</i>

Results from the list of forms and interviews with lecturers showed that all the lecturers (100%) agreed if the University also focuses on entrepreneurship activities, they also agreed that the University and or the Faculty supported entrepreneurship activities, as the majority (80%) of the participants have side jobs. They will be more than happy if they have a place at University to market their products. They were all (100%) agreed that boardgame could become one of the entrepreneurship products from the Faculty, as according to them, psychology and the majority of the alumni of psychology were involved in training activities so that additional tools will be worthwhile for them. Further, they also mentioned that training events and sessions need more exciting activities that were fun, engaging, and discuss the training content-all of these requirements are filled by boardgame activities.

V. CONCLUSION

This research shows that board games could be used as one of the tools in adult learning. Using board games in learning programs could give the participants challenges and opportunities to solve problems. It means that board games can fulfill andragogy principles. Hence, it is easier for adults to learn new things in such away. In the era of Industry 4.0, where everybody needs to acquire or enhance abilities to adapt to the current condition, board games could enable people to learn. These results support other studies that found the positive impact of board games in learning, such as using board games to enhance computational thinking (Gentile et al., 2019) and teamwork (Foltz et al., 2019; Treher, 2011). In addition to that, this study supports the findings by Hamari et al. (2014), who pointed out that gamification will develop motivation, which resulted in psychological outcomes that lead to other targeted positive behavioral outcomes.

The research showed that board games have some characteristics that can measure several things as follows: cooperation, strategy, communication coordination, problem-solving decision making, strengthening the relationship, accuracy, emotional control concentration, and creativity. It also enables us to encourage the exchange of ideas between participants, understands the opinion of someone Besides that, board games have some natures such as exciting, fun, and challenging, enabling and stimulating creative thought (Treher, 2011). This research also supports the previous study of (Fjællingsdal & Klöckner, 2020; Foltz et al., 2019), which revealed that board games will create a dynamic interaction with the other players that leads to being better teamwork.

Over the past decade, board games have gained increased prominence attention within the game industry. However, board games are mostly used for play and entertainment, while universities can develop board games for both education and entertainment (edutainment). This paper tries to clarify the contribution of gamification methods and tools toward the learning and development program's success. This condition is probably why gamification approaches are becoming more widespread among many creative teams and organizations. On the other hand, like gamification and a board game also has some limitations, it recommends that people who will use board games to make money should pay into consideration these limitations and try to overcome them. Meanwhile, a campus climate is an ideal environment to develop students as young entrepreneurs. Entrepreneurial activities on campus will also create a pleasant climate and a good relationship between lecturers and students. Entrepreneurship will also enhance all parts' image and reputation: the students,

lecturers, Faculty, and the University. Thus, a board game can be used as an entrepreneurial product of the University.

The study provides empirical evidence of board games in adult learning for the people development program to face Industry 4.0. The study also showed that universities should take part in developing entrepreneurship activities by supporting them. The study also revealed that boardgame could become one of the products from the University, especially from the Faculty of Psychology. This study has some limitations: First, this study was only conducted at the participants from one holding company that participates in the training program. Further study with larger participants and from various companies is recommended. Second, this study only uses simple descriptive analysis from the participant's evaluation.

Further studies using more data from different sources are needed. Third, this study is only based on the participants' evaluation of two types of board games. A further study from many types of board games is recommended. Fourth, the limitations of this study are the use of a small data sample due to the qualitative data used. As a result, the same research could be replicated using a bigger data size to gain more perspective, the utilization of board games in other competencies, and its effectiveness compared to other methods. Further, it is also recommended to conduct further study in many different board games and settings and many different types of groups.

ACKNOWLEDGMENTS

This study was conducted with the funding from the Minister of Research and Higher Education under the grant Community Engagement of PUPIK.

REFERENCES

- Benešová, A., & Tupa, J. (2017). Requirements for Education and Qualification of People in Industry 4.0. *Procedia Manufacturing*, 11, 2195–2202. <https://doi.org/10.1016/j.promfg.2017.07.366>
- Bonekamp, L., & Sure, M. (2015). Consequences of Industry 4.0 on Human Labour and Work Organisation. *Journal of Business and Media Psychology*, 6(1), 33–40. https://journal-bmp.de/wp-content/uploads/04_Bonekamp-Sure_final.pdf
- Bryan, V. C., Musgrove, A. T., & Powers, J. R. (2017). Handbook of research on human development in the digital age. In *Handbook of Research on Human Development in the Digital Age*. IGI Global. <https://doi.org/10.4018/978-1-5225-2838-8>
- Fjællingsdal, K. S., & Klöckner, C. A. (2020). Green Across the Board: Board Games as Tools for Dialogue and Simplified Environmental Communication: <https://doi.org/10.1177/1046878120925133>, 51(5), 632–652. <https://doi.org/10.1177/1046878120925133>
- Foltz, A., Williams, C., Gerson, S. A., Reynolds, D. J., Pogoda, S., Begum, T., & Walton, S. P. (2019). Game Developers' Approaches to Communicating Climate Change. *Frontiers in Communication*, 4, 28. <https://doi.org/10.3389/FCOMM.2019.00028/BIBTEX>
- Forrest, S. P., & Peterson, T. O. (2017). It's Called Andragogy. *Academy of Management Learning & Education*, 5(1), 113–122. <https://doi.org/10.5465/AMLE.2006.20388390>
- Fullerton, T. (2015). GameDesignWorkshop. In *Boundaries of Self and Reality Online: Implications of Digitally Constructed Realities*. Elsevier Inc. <https://www.routledge.com/Game-Design-Workshop-A-Playcentric-Approach-to-Creating-Innovative-Games/Fullerton/p/book/9781138098770>
- Gentile, M., Allegra, M., & Söbke, H. (2019). Games and Learning Alliance. In M. Gentile, M. Allegra, & H. Söbke (Eds.), *7th International Conference, GALA 2018, Palermo, Italy, December 5–7, 2018, Proceedings* (Vol. 11385). Springer International Publishing. <https://doi.org/10.1007/978-3-030-11548-7>
- Gorecky, D., Schmitt, M., Loskyll, M., & Zühlke, D. (2014). Human-machine-interaction in the industry 4.0 era. *Proceedings - 2014 12th IEEE International Conference on Industrial Informatics, INDIN 2014*, 289–294. <https://doi.org/10.1109/INDIN.2014.6945523>
- Hagen, M., & Park, S. (2016). We knew it all along! Using cognitive science to explain how andragogy works. *European Journal of Training and Development*, 40(3). <https://doi.org/10.1108/EJTD-10-2015-0081>
- Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work? - A literature review of empirical studies on gamification. *Proceedings of the Annual Hawaii International Conference on System Sciences*, 3025–3034. <https://doi.org/10.1109/HICSS.2014.377>
- Hecklau, F., Galeitzke, M., Flachs, S., & Kohl, H. (2016). Holistic Approach for Human Resource Management in Industry 4.0. *Procedia CIRP*, 54, 1–6. <https://doi.org/10.1016/J.PROCIR.2016.05.102>

- Henschke, J. A. (2016). A History of Andragogy and its Documents as they Pertain to Adult Basic and Literacy Education. *PAACE Journal of Lifelong Learning*, 25, 1–28. <http://www.andragogy.net>
- Hisrich, R. D., Peters, M. P., & Shepherd, D. A. (2010). *Entrepreneurship*. McGraw-Hill.
- Jean-Pierre, B., & Emin, S. (2006). Students and entrepreneurship: The effect of training. *Conference of the International Association of Strategic Management*.
- Kapp, K. M. (2012). Games, Gamification, and the Quest for Learner Engagement. *Training and Development*, 66(6), 64–68. <https://www.td.org/magazines/td-magazine/games-gamification-and-the-quest-for-learner-engagement>
- Koster, R. (2013). *A theory of fun for game design* (2nd ed.). O'Reilly Media, Inc. <https://www.oreilly.com/library/view/theory-of-fun/9781449363208/>
- Kritikos, A. S. (2014). Entrepreneurs and their impact on jobs and economic growth. *IZA World of Labor*, 8, 1–10. <https://doi.org/10.15185/IZAWOL.8>
- Lasi, H., Fettke, P., Kemper, H. G., Feld, T., & Hoffmann, M. (2014). Industry 4.0. *Business and Information Systems Engineering*, 6(4), 239–242. <https://doi.org/10.1007/S12599-014-0334-4>
- Liao, Y., Deschamps, F., Loures, E. de F. R., & Ramos, L. F. P. (2017). Past, present and future of Industry 4.0 - a systematic literature review and research agenda proposal. <https://doi.org/10.1080/00207543.2017.1308576>
- Lu, Y. (2017). Industry 4.0: A survey on technologies, applications and open research issues. *Journal of Industrial Information Integration*, 6, 1–10. <https://doi.org/10.1016/J.JII.2017.04.005>
- MacKeracher, D. (2004). *Making sense of adult learning* (2nd ed.). University of Toronto Press. <https://www.worldcat.org/title/making-sense-of-adult-learning/oclc/635458113>
- Mangundjaya, W. (2019). Research on the impact and benefits of boardgame. *Limited Publication, Faculty of Psychology, Universitas Indonesia*.
- Mangundjaya, W. (2012). Challenges in Developing Young Entrepreneurs at Work (A Study at Unemployed Youth in Indonesia). *Proceedings International Conference on Regional Development (ICRD)*, 121–126. https://www.academia.edu/7148247/Challenges_in_Developing_Young_Entrepreneurs_at_Work_A_Study_at_Unemployed_Youth_in_Indonesia
- Mangundjaya, W., Rachmawan, A., & Lizar, A. A. (2015). The Role of Parent's Influence and Self Efficacy on Entrepreneurial Intention. *The Journal of Developing Areas*, 49(3). https://www.academia.edu/35594255/The_Role_of_Parents_Influence_and_Self_Efficacy_on_Entrepreneurial_Intention
- Qin, J., Liu, Y., & Grosvenor, R. (2016). A Categorical Framework of Manufacturing for Industry 4.0 and Beyond. *Procedia CIRP*, 52, 173–178. <https://doi.org/10.1016/J.PROCIR.2016.08.005>
- Ras, E., Wild, F., Stahl, C., & Baudet, A. (2017). Bridging the Skills Gap of Workers in Industry 4.0 by Human Performance Augmentation Tools: Challenges and Roadmap. *ACM International Conference Proceeding Series, Part F1285*, 428–432. <https://doi.org/10.1145/3056540.3076192>
- Roblek, V., Meško, M., & Krapež, A. (2016). A Complex View of Industry 4.0: <https://doi.org/10.1177/2158244016653987>
- Rothwell, W. J. (2008). *Adult Learning Basics* (1st ed.). ASTD Press.
- Schmidt, R., Möhring, M., Härting, R. C., Reichstein, C., Neumaier, P., & Jozinović, P. (2015). Industry 4.0 - Potentials for creating smart products: Empirical research results. *Lecture Notes in Business Information Processing*, 208, 16–27. https://doi.org/10.1007/978-3-319-19027-3_2
- Shamim, S., Cang, S., Yu, H., & Li, Y. (2016). Management approaches for Industry 4.0: A human resource management perspective. *2016 IEEE Congress on Evolutionary Computation, CEC 2016*, 5309–5316. <https://doi.org/10.1109/CEC.2016.7748365>
- Treher, E. N. (2011). *Learning with Board Games Tools for Learning and Retention*. www.thelearningkey.com
- Vaidya, S., Ambad, P., & Bhosle, S. (2018). Industry 4.0 – A Glimpse. *Procedia Manufacturing*, 20, 233–238. <https://doi.org/10.1016/J.PROMFG.2018.02.034>
- Zhou, K., Liu, T., & Zhou, L. (2015). Industry 4.0: Towards future industrial opportunities and challenges. *12th International Conference on Fuzzy Systems and Knowledge Discovery (FSKD)*. <https://doi.org/10.1109/FSKD.2015.7382284>