Decent work design: it's in the game.

instructing students with knowledge of work design using a simulation game.

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Abstract

The persistence of low job satisfaction levels in Western organizations begs the question whether insights from work design theory are adopted to practice. Therefore, this master's thesis explored the relationship between a simulation of work design elements and the degree to which it succeeds in instructing management students with knowledge of work design. Additionally, it investigated whether this effect would be moderated by the learning experience (LE) provided by the simulation. A general questionnaire (N = 131 students) was used as the basis for a Multilevel Regression Analysis. Statistical proof was found for the moderating effect of LE, revealing that a high-quality LE facilitated the relationship between enriched work design and knowledge levels. It was concluded that if the required skill set to be learned requires application, one can expect simulation-based training to be a useful tool. However, with its use come a host of deliberations relating to its implementation. Finally, the study reveals the need for more adequate measurement instruments related to work design knowledge.

Introduction

In 2016, a survey found that one out of five workers in the European Union operated in what could be described as a 'poor quality' job (Eurofound, 2016). In such jobs, workers deal with an absence of job characteristics such as autonomy, variety, and social support, whilst also meeting unreasonable levels of job demands such as workload (Parker et al., 2019). Indeed, a follow-up survey revealed that just 36% of EU jobs offer sufficient autonomy and challenges to workers (Eurofound and Cedefop, 2020). This is surprising, given that there is a rich body of theories and models describing how work could be designed in a meaningful and engaging fashion. It would be worth the effort to investigate why and where the 'translation' of work design theory to practice encounters problems, which this thesis aims to address through exposing participants to an experiment in the form of a simulation game.

History has seen many work design theories rise and decline. The first systematic approaches emerged in the early 20th century and were focused on maximizing worker efficiency. Yet, these approaches resulted in low levels of job satisfaction and decreased performance (Humphrey, Nahrgang & Morgeson, 2007). A famous example forms the study of the Durham coal mines, where it was found that top-down approaches focused on efficiency decreased rather than increased performance (Trist & Bamforth, 1951). This realization paved the way for motivational theories, which sought to produce ways to design work with high levels of autonomy and task variety, so-called 'enriched' work design (Hackman & Oldham, 1976). These theories were attempts by scholars to understand how work could satisfy important human needs while maintaining productivity (McGregor, 1960). Then around the 1950s, researchers started to focus on a design approach that involved creating autonomous work groups, as they realized how psychological factors (such as motivation) were affected by the way work was designed (Parker, Morgeson & Johns, 2017). Today, it is estimated that the research field of work design by now has seen well over 17.000 publications (Parker et al., 2017). With this many approaches to work design, there are bound to be differences in definitions of work design. In line with said meta-analysis, this thesis employs a broad definition of work design: "the content and organization of one's work tasks, activities, relationships, and responsibilities" (Parker, 2014, p.662).

Although research has put much emphasis on deriving lessons from practice for developing theories, less is written on how knowledge from theories is applied by practitioners. Based on the number of poor-quality jobs mentioned earlier, one might argue that the influence of work design theories on practice is unsatisfactory. One reason forms the inability of instruments to transfer knowledge of work design in an effective manner. The need for such instruments becomes more urgent given that individuals with no knowledge of work design tend to create boring jobs (Parker, Andrei & Van den Broeck, 2019). These could be described as jobs with little variety and challenges (Campion & Stevens, 1991), where performance issues are attributed to worker' motivation instead of design factors (Parker, 2021). However, one exception to this seems to be managers who are equipped with work design knowledge, as they tend to create higher quality work designs (Parker et al., 2019). Such findings imply that proper work design does not come naturally to us, and that superior methods are required to teach those aiming become design practitioners.

An explanation for why applicable instruments for work design have been quite absent is the tendency of MBA programs to focus on teaching theory rather than application. As a result, students are provided with little tools when entering the workforce. This becomes problematic, as managerial work often requires skills acquired through practice for making adequate decisions (Salas, Wildman & Piccolo, 2009). Hence, one conclusion may be that work design needs to gain more ground in MBA programs. In that case, one may argue that experience as a manager cannot be simulated by passive training models (e.g., using books or lectures). One study made this noticeably clear by distinguishing between 'tacit knowledge' and 'explicit knowledge' (Masters, 1992). The researchers asked subjects to learn how to golf using explicit knowledge (i.e. being instructed about how to golf before experiencing it themselves). The other group received no such instruction and were instead left to their own devices. They found that the group who acquired explicit knowledge performed worse in golf than the group that acquired tacit knowledge (i.e. those who were allowed to experience golf without instruction). This does not mean however, that explicit knowledge does not have a function. It is more useful to see these aspects as complementary in the creation of knowledge, meaning it requires both (Nonaka, Toyama & Konno, 2000). Similar to the skill of golfing, designing work requires practical experience, either through designing enriched work for others, or by experiencing enriched work by oneself (Parker & Jorritsma, 2020).

Yet, it is unclear as to how to transfer this knowledge. Past studies generally seem to agree that passive approaches are not effective to reach this goal, as they lack engagement with the learner (Mitton, Adair, McKenzie, Patten, & Perry, 2007). Methods that *are* regarded by studies as effective in transferring knowledge, often lack rigorous evidence to back up their claims (Mitton et al., 2007). A promising method for building student's knowledge of work design lies in simulation-based training. Simulations are artificial environments that manages one's experience with reality (Bell, Kanar & Kozlowski, 2008). Simulations provide a means to develop competencies (skills, concepts, knowledge) in a training environment focused on improving performance (Salas, et al., 2009). In other words, it attempts to create a situation closer to reality that allows individuals to learn these competencies through experience. Simulation-based training (SBT) has seen increased usage in management education to transfer knowledge, because of reports that management professionals severely lacked practical experience early in their careers (Salas et al., 2009).

Management simulations are often built upon the view of learning proposed by Experiential Learning Theory (ELT), which argues that learning comes to fruition through experience (Kolb, 1984). Compared to more traditional learning theories, ELT emphasizes how theory and practice are interwoven. By providing students with timely feedback, they can change their strategy, and thus learn from their mistakes and successes. In addition, simulation-based training allows for students to be effectively immersed in a realistic context, while also being primarily risk-free (Salas et al., 2009). For these reasons, this thesis builds on SBT as a method to increase knowledge on work design, as it has been argued that these skills are needed in contemporary organizations. The main question that this thesis attempts to answer is this: *To what extent is the learning experience of a simulation game able to increase knowledge of work design in management students?* The participants of the simulation will be management students who, in time, may need work design skills as managers or consultants. It will be elaborated upon how design knowledge consists of three categories, cognitive-, affective- and skills knowledge (Kraiger, Ford & Salas, 1993). These types will simultaneously serve as learning outcomes of the simulation, given that specifying learning outcomes is important for assessing the effectiveness of any simulation (Salas et al., 2009).

This thesis aims to contribute to the literature on work design in the sense that it may provide evidence for the effectiveness of simulation-based training as a method for transferring work design principles. Its insights will, at best, provide work design scholars with evidence for the notion that ‘poor work design begets poor work design’ (Parker et al., 2019); meaning that poor knowledge of work design consequently leads to poor work design in organizations. At the very least, it aims to provide a framework for (management) educators to implement simulations related to work design. As of now, simulations teaching this skill are near non-existent. This thesis may also gather information on how design knowledge specifically can be integrated in simulation-based training. From a practical perspective, this thesis might inspire teachers to improve instructing methods in management education, specifically in work design courses. Most of all, if the notion of ‘poor work design begets poor work design’ holds true, increasing students’ work design knowledge through a simulation game may refrain management students (as future consultants/managers) from designing boring jobs. Perhaps, it even enables them to design enriched work. The following sections will respectively discuss past work design theories in more detail, discuss past interventions that aimed to increase design knowledge, and finally, discuss how simulations may, through their learning experience, be an appropriate intervention for increasing work design knowledge. Finally, it addresses how a simulation was implemented in Dutch management education.

Theoretical background

1. Work design theory

Before diving into past design theories, we need a sense of the many ‘levels’ at which design can be envisioned. First off, the introduction of the concept of work design was a consequence of the realization that ‘job design’ was too narrow in its definition. Job design research assumed workers merely participated in activities that were assigned to them (‘sticking to their job’). Instead, work design included the observation that workers increasingly initiated activities that were not part of their job (Parker et al., 2017). Another part of the definition was the recognition of relationships between workers and their interactions with other tasks, allowing work design to be considered on levels beyond the individual. To put it another way, job design was primarily centered around job characteristics of the individual, whereas work design linked the job with its environment (Morgeson & Humphrey, 2006). Whereas many job- and work design studies originated from organizational psychology or HRM backgrounds, design theories started to emerge that took a broader approach. Such theories emphasize the term 'organization design' and argue that tasks are primarily dependent on their context within the organization, where an individual is part of a team, which is part of a business unit, and so on. This does not mean design cannot be located at the individual or team-level, yet it means individual- or team-based design is part of an effort to redesign the entire organizational 'structure' (Kuipers, Van Amelsvoort & Kramer, 2020). Zooming out even further, there can be wider organizational influences such as policies or financial outcomes that affect work design (cf., an overview on key perspectives in Knight & Parker, 2021). The approach in this thesis revolves around the definition used earlier for work design, which recognizes that work design involves more than the worker's immediate tasks and considers different levels of design (Parker et al. 2017). In other words, work design is viewed here as an overarching concept incorporating elements from both job- and organization design.

The first work design theories emerged around the 1900s, whose premise was that performance and efficiency could be maximized through simplifying jobs. Yet, concerns around what became known as 'scientific management' increased. Critics argued that employees were seen in a very mechanistic view, where they were resources to be used (Wagner-Tsukamoto, 2008). Instead, a sense started to develop that worker motivation, through the strength and presence of certain work characteristics, could increase individual performance (Hackman & Oldham, 1975). Work characteristics could be viewed as 'ingredients' of worker motivation. The Job-Characteristics model (Hackman & Oldham, 1975), for instance, included five ingredients for motivating employees: autonomy, skill variety, task identity (i.e. how much of the work an individual can complete), task significance (i.e. how much does their work affect others' lives) and feedback from their work (i.e. the information one gets on their performance). Another significant contribution formed the demands-control model (Karasek, 1979). Previous theories were not able to explain how certain job types (i.e. passive, or active) could explain why employees could feel mentally strained. The demands-control model found that low levels of autonomy and a high number of demands could lead to high stress levels while performing tasks. High demands without autonomy meant workers had to deal with, yet were not allowed, to manage problems in their work environment. Both theories remain relevant today, as in the case of the Eurofound surveys (2016; 2020), which approached work design through the lens of the demands-control model. However, one common criticism is that these theories often ignore social aspects and specific contexts in in their work designs (Humphrey et al., 2007).

The ingredients of work design introduced in the 80s and 90s were similar to those of motivational theories. Yet, there was an increasing need for organizations to account for flexibility and productivity. This led to the existence of socio-technical systems (STS) design. Stemming from engineering countries such as Sweden and Germany, STS design valued 'flexibility,' 'process control,' 'innovation capacity,' and 'product quality' (Kuipers, Van Amelsvoort & Kramer, 2020). It emphasized how psychological and technological aspects (i.e., the production process) of a task could not be separated. Organizations could no longer afford to isolate individual jobs without considering the environment an organization operated in. Nonetheless, changes in the environment did not necessarily mean work design was required to change. Unlike with the scientific management approach, STS design understood how work design was not at the mercy of innovative technology. Instead, adapting to changes was a choice designers could make, hence the concept 'organizational choice' was introduced (Trist et al., 1963). Its inclusion of technical aspects allowed for the development of concrete principles for designing jobs, whereas previous theories were more abstract in their propositions. At first, design was primarily focused on the team-level. STS design sought to create autonomous groups (or teams) who could function as a system, rather than as a collection of individual jobs (Kuipers et al., 2020). Further evolutions of STS design put less emphasis on the goal of creating autonomous teams, and shifted to a more integral approach where the entire organization was to be involved. Dutch work design research introduced Integral Organization Renewal (IOR), with the goal to create simple organizations with complex jobs, instead of complex organizations with simple jobs (De Sitter, Den Hertog, Dankbaar, 1997).

Whilst sharing the idea that organizations increasingly needed flexibility and productivity, IOR theory instead proposed to approach work design holistically. This means that designs should be held in light of an organization's 'structure,' a complex network of interdependent jobs (Mintzberg, 1980). One may argue such a viewpoint is radically different from design theories concentrated on the individual job, yet this is not the case. In fact, a well-designed structure can improve individual characteristics such as worker creativity and engagement. Similarly, a poorly designed structure can have a negative impact on these characteristics (Kuipers et al., 2020). How IOR strives for organizational flexibility is best illustrated by discussing two idealistic structures often considered opposites: the 'bureaucratic' and 'flexible' structure (Kuipers et al. 2020). In the bureaucratic structure, jobs are simple and impart little autonomy to workers. They are blind to changes in their environment, while such changes remain affecting their operations (Achterbergh & Vriens, 2019). Additionally, they do not provide employees with enough learning opportunities, as the tasks they perform are simplistic and repetitive. In contrast, the flexible organization actively tries to align itself with its environment (Kuipers et al., 2020). The flexible structure involves a large degree of self-management by employees. Tasks are characterised by reduced simplicity and repetition, with employees also afforded adequate autonomy and control over their job responsibilities. Tasks encompass the entire production process, where employees may deal with disturbances themselves. This allows them to learn and detect errors sooner (Achterbergh & Vriens, 2019). However, IOR theory argues flexibility can only be achieved by assigning employees with responsibilities, by providing them with learning opportunities to solve problems (De Sitter et al., 1997). Yet, IOR experiments in Dutch organizations were not successful, which stirred another conclusion. Namely, that gaining knowledge should not be exclusive to aspects of the job itself:

> "The design process was, irrespective of all good intentions, in fact, dominated by design experts. General standard solutions were imposed on organizational members to solve local problems. Local contingencies and local knowledge were being disregarded. And even more important: solutions and problems were not owned by local players, but by experts from the outside." (De Sitter et al., 1997, p. 500-501)."

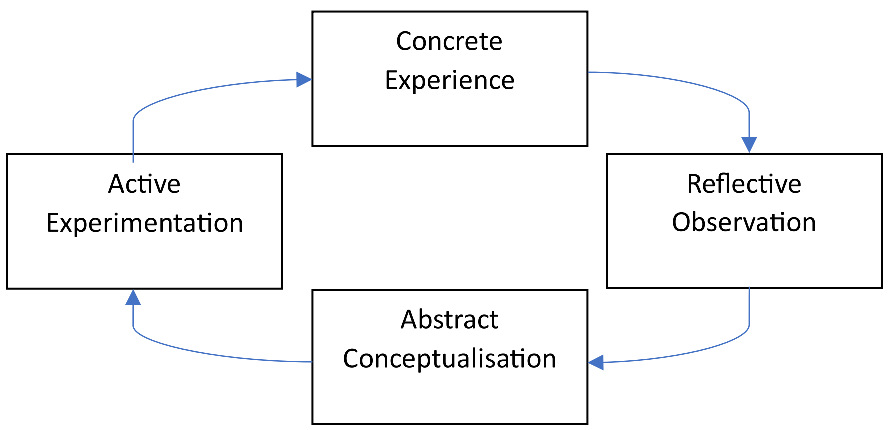
2. Knowledge of work design

Although the discussed theories have provided great insights for designing more meaningful work, simple jobs seem to persist regardless. In fact: "some scholars suggest that efforts to standardize work and lower discretion may even be increasing in professional contexts" (Parker et al., 2017, p.27). This rise of simplistic work is echoed by studies within the context of Dutch organizations as well, highlighting how organizations with bureaucratic structures are plentiful (Kuipers et al., 2020), This tendency to standardize and simplify might appear contradictory, given that work has seen major technological changes along with increasing uncertainty, cognitive demands, and complexity (Humphrey et al., 2007). This contradiction led scholars to investigate whether proper work design is a skill one must learn or that it comes naturally to us. One such study asked management students to design fictitious jobs for others (Campion & Steven, 1991). They found that the most common strategy of students was to group similar tasks or required skills together. Their reasoning was that grouping allowed for high specialization of skills and would lead to increased productivity. Very few students argued that their design choices relied on any form of previous work experience or consideration of worker needs. In fact, only 2.9% of participants included psychological needs of the workers in their designs. A more recent replication of this study sought to find out if including individuals *with* work experience would alter results (Parker et al., 2019). In the first experiment, students without any training in work design theory were included, who again, tended to design work in a simplistic way. Then, a second experiment followed with a sample of organizational psychologists trained in motivational work design theories, next to possessing about 25 years of work experience. Although explicit knowledge of work design helped refrain the psychologists from blaming the individual worker for their performance, it did not enable them to apply this knowledge in their new designs. They concluded that if individuals experienced enriched work themselves, this allowed them to design enriched work for others as well. A process that may lead to a cycle of increased improvements. The discussed findings reveal how instruction of work design principles, or explicit knowledge, is not sufficient to change design behaviour.

3. Experiential learning

This conclusion is not unique to work design, as exemplified by an experiment mentioned earlier, in which participants required implicit knowledge to learn the skill of golf (Masters, 1992). To further understand the workings of implicit knowledge, we may turn toward the framework of Experiential Learning Theory (henceforth ELT) (Kolb, 1984). ELT is based on the idea that "knowledge results from the combination of grasping and transforming experience" (Kolb, 1984, p. 41). In simpler terms, the theory emphasizes 'learning by doing,' where learning is considered the creation of knowledge. According to the theory, learning is a holistic concept, meaning that learning is done by one's entire being, not just by our cognition or senses. It is a process, rather than merely an outcome, where the learner undergoes a learning cycle including 'concrete experience,' 'reflective observation,' 'abstract conceptualisation' and 'active experimentation' (see figure 1).

Figure 1. The Experiential Learning Theory cycle (Kolb, 1984).



In the first stage, the learner encounters an event or activity directly, either physically or emotionally. After the experience, individuals reflect on what happened, which is called ‘reflective observation.’ They analyse the experience, predicting potential outcomes, feelings, and thoughts. In the ‘abstract conceptualization’ stage, individuals try to make sense of their experiences by forming generalizations or theories. They connect the observed patterns with existing knowledge or concepts, seeking to understand the underlying principles. Armed with new understandings, individuals apply what they have learned to new situations or problems, known as ‘active experimentation.’ They test out their ideas, actively engaging in new experiences and cycles of learning. Here, it becomes apparent that active experimentation can either be encouraged or discouraged depending on work design choices. For example, enriched work design may lead to increased learning and in turn, higher job satisfaction (Karasek & Theorell, 1990); may allow for skill utilization, i.e. learning and applying skills on the job (Morrison, Cordery, Girardi & Payne, 2007); may stimulate the use of learning strategies and generation of ideas (Holman, Totterdell, Axtell, Stride, Port, Svensson & Zibarras, 2012); and may lead to intrinsic motivation to learn (Gibbs, 2021). Similarly, flexible structures allow employees to detect and correct errors earlier primarily because ‘active experimentation’ is encouraged (Achterbergh & Vriens, 2019). What remains unclear however, is whether such positive effects of increasing job-specific knowledge are present when the subject is design knowledge.

Although ELT is very adequate in describing the process of acquiring knowledge, lacking in our framework is a way to evaluate learning outcomes. Research has proposed three types of learning outcomes (or goals): cognitive-, skill-, and affective based (Kraiger, Ford & Salas, 1993). Any type of training program should, according to the authors, strive to include these three outcomes. Cognitive learning outcomes are, first, about memorizing information. Often, those who do well in this stage are seen as intelligent and are expected to perform better across all stages (Ackerman, 1987). However, these are not relevant to our purpose as previously discussed findings demonstrated how factual knowledge of work design principles was not sufficient to predict performance (Parker et al., 2019). More relevant are skill-based learning outcomes, which refer to establishing procedures for tasks that require a certain amount of standardization (Kraiger et al., 1993). For example, when a sales employee aims to know which sales technique to apply to which circumstances, this knowledge becomes internalized. At one point, behaviour is entirely internalized, and cannot be made explicit anymore (and thus becomes implicit). Given that work design requires application of knowledge, this means that skill-based outcomes could be considered essential. Lastly, affective-based learning outcomes refers to self-efficacy, which involves how one perceives to perform on a given activity (Bandura, 1977a). Perceived self-efficacy facilitates the amount of effort that students are willing to invest, and their persistence when confronted with setbacks (Schwarzer & Jerusalem, 1995). Affective-based outcomes are important for work design as well. For example, studies noted how high autonomy may both motivate and allow employees to develop learning strategies (Holman et al., 2012). This increases the belief that they are capable of solving problems. Thus, the idea is that an adequate learning experience may predict increased motivation, skills, and knowledge to design better work.

4. simulation-based training

With a theoretical framework for instructing work design knowledge in place, what is left is to consider what methods, or 'interventions,' can be chosen to instruct design knowledge. Interventions are often directed top-down, meaning they follow a hierarchy from managers to their employees. Top-down interventions by management are quite common because managers are often charged with solving two fundamental problems of organizing: 'division' and 'integration' of labour (Parker & Jorritsma, 2020). If, for example, managers incorporate an empowering leadership style, they may choose to trust individuals with more autonomy. Doing so, they impact work design in a direct way. A recent meta-analysis found that out of fifty-five top-down redesign interventions, thirty-nine were found to have a positive effect on organizational performance: meaning increased profit, customer satisfaction, etc. (Knight & Parker, 2021). Although studies did not account for work design knowledge specifically, it is possible that knowledge-levels increased as a side-effect of enriched work design. This study may be the first to devise an intervention specifically focused on instructing work design knowledge. Despite the importance of work design, it has been argued how its often overlooked in MBA programs (Parker & Jorritsma, 2020), A promising avenue for an intervention then, is through management education. This approach may prove particularly fruitful given that students make up the future workforce both in employee *and* manager roles.

This leads us to consider simulations, which are "artificial environments that are carefully created to manage individuals' experiences of reality" (Bell et al., 2008, p.1417). Simulation-based training (SBT) may provide a solution to more traditional education methods, as they allow for a merger of theory and practice. SBT challenges the view that theory must be taught first before the acquired knowledge is applied in practice (Salas et al., 2009). Central to the concept is therefore the 'learning by experiencing' approach comparable to the ELT framework (Lane, 1995). During simulations, participants are debriefed after each stage of learning (see figure 1), for example, by asking questions such as: 'what could you have done differently?' (Bowe, Johnson, & Puscas, 2017). This prompts the learner to reflect on the experience and produce alternative strategies (abstract conceptualization). In the next stage, these decisions are actively experimented with, testing whether the new strategy has improved over the old. Thus, what sets simulations apart from other learning methods is their ability to for the learner to acquire implicit knowledge, or experience on the subject matter. Other advantages are the increased enjoyability and immersion experienced by the learner (Lane, 1995). Management simulations often include competitive elements found in business settings; hence they are often referred to as 'simulation games.' Examples include a simulation game in which students were appointed as managers of a hypothetical film studio. (Devine, Habig, Martin, Bott, & Grayson, 2004). The students were presented with problems such as to decide what screenplays to produce, and how to make a profit in doing so. After each decision period, teams would receive feedback about the profit of each film and the company at large. Another example of a simulation game involved novice accounting students who were tasked with buying and selling merchandise (Phillips & Graef, 2014). Although accounting was considered a complex topic, students reported increased confidence, enjoyment, and a deeper understanding of accounting after the simulation (cf. North-Samardzic & de Witt, 2019, for an overview of management simulations employing students). Since management simulations allow participants to make important decisions for an entire business, it may not be surprising that business simulations have seen increasing use in Western management education (Hallinger & Wang, 2020).

In conclusion, it has been made apparent that decreasing job satisfaction levels are related to an absence of work design knowledge in today's managers. Management education has been cited as one of the causes, emphasizing learning theory over application. Nonetheless, it is not clear which methods are best suited to train students. Given that the topic of work design is strongly linked to application (Parker et al., 2017), a promising avenue for application involves the use of simulations. Simulations are based on the idea that learning through experience increases the knowledge, skills, and motivation of individuals to learn practical subjects such as work design. When well-designed, they are presented as an effort to close the gap between theory and practice (Salas et al., 2009). Taking all this into account, the present study's goal is to provide evidence for the use of simulations in management education, as well as to instruct students with work design knowledge to prompt them to design higher quality work as future managers. To reach this goal, this thesis will make use of a simulation that requires students to assume a role in a fictitious company. The use of a simulation game on two occasions should show both increases in participants' confidence to design enriched work after the second occasion, as well as increases in implicit knowledge when asked to design work for others. In other words, it is expected that the flexible structure will cause higher levels of perceived capabilities when designing enriched work (hypothesis 1a), and that they opt for enriched design strategies more often (hypothesis 1b). The first hypothesis has therefore two aspects to it:

Hypothesis 1a: *After the simulation of enriched work design, students report significantly higher levels of perceived self-efficacy when designing work for others compared to the simulation of poor work design.*

Hypothesis 1b: *After the simulation of enriched work design, students report significantly higher levels of enriched skills knowledge and lower levels of poor skills knowledge when designing work for others compared to the simulation of poor work design.*

Second, based on ELT it is expected that the increase of design knowledge and perceived self-efficacy because of the simulation game, is due to an interaction between the learning experience and the simulation game (in the case that hypotheses 1a and 1b hold true). Thus, the second hypothesis is as follows:

Hypothesis 2: *After a simulation of enriched work design, the quality of learning experience should have a positive moderating effect between the simulation and skill- and affective based learning outcomes.*

The results of this thesis may further integrate work design theory and practice through evaluating the use of simulations as a learning method in management education. In addition, it hopes to provide empirical evidence for a 'learning by doing' approach, which is lacking in the context of work design.

Methodology

Participants

Management students from a Dutch university took part in the study. While the course involved 248 students, problems occurred when attempting to link data to a personal code given to participants. As some participants showed up only once or were incomplete in their answers, the final sample consisted of 131 students. The participants were mostly bachelor's in business administration (80%) with more than half (58%) of Dutch nationality. In line with the learning goals of the course Introduction to Organization Design, students were required to participate in the study. The average age of the sample was 20.77 years (SD = 1.70; range 19-29 years), and about 60% were male. Most were employed (80%), with only a portion of participants (9.9%) confirmed to be unemployed at the time of the survey. Average work experience was 4.23 years (*SD* = 2.14 years). More than two-thirds (78.6%) worked in private for-profit companies, with the remaining participants working for private non-profit companies (2.3%), working for government institutions (3.1%), or working without salaries (4.6%). The average monthly work hours were 41.52 hours (*SD* = 32.51 hours). Most participants worked in the gastronomy sector (18.3%). Other sectors included production and logistics (14.5%), administration or consultancy (7.6%), customer service (6.9%), financial services (6.1%), education (5.3%), banking/accounting and marketing/IT (both respectively 3.1%), healthcare (0.8%), and other (which includes the self-employed; 13.7%).

Procedure

Two physically based simulation games were conducted (Salas et al., 2009), in which participants operated in a fictitious company called Papilan Pty Ltd. The purpose of this company was to produce Chinese lanterns of high quality. Before the start of the simulations, a pre-test was carried out for a number of control variables along with the affective- and skill-based learning outcomes. Students were subjected to the simulation on two occasions within the span of two weeks, effectively resulting in two separate simulations. The simulations resemble bureaucratic and flexible structures as conceptualized by IOR design theory (Kuipers et al., 2020). This means the research design is that of an experiment where there is a distinction between condition A (poor work design) and condition B (enriched work design). After both occasions, a post-test was held for all variables. An ideal number of participants is N=23 for the bureaucratic structure and N=17 for the flexible structure. However, although students were required to be present for the experiment, there is the possibility that a few participants have dropped out. This could not be prevented given that students could still pass the course even when absent during one of the sessions. Thus, it means that the target number above describes an ideal situation.

The procedure followed for the simulation was based on the ‘stages for successful implementation of SBT’ (Salas et al., 2009). These stages of SBT development are based on the following training design principles; (1) training needs analysis, (2) development of task competencies, (3) specification of training objectives, (4) development of training events, (5) development of measures, (6) diagnosis of performance, and (7) feedback and debriefing. Regarding the first principle, it has been argued that students lack the skills on how to design decent work. This is based on the growing concern that instruction of work design principles has been absent from management education (Parker & Jorritsma, 2020). In the second stage, learning outcomes are set on a more general level (Salas et al., 2009). Generally put, students are expected to gain work design knowledge by participating in the simulation. Third, the researcher should narrow down the objective of the simulation. Here, students are expected to design better jobs in the future through acquiring work design knowledge. Fourth, this simulation requires students to design the work needed to complete production of the lanterns. Thus, the simulated work design elements should function as a trigger for the required skills. Fifth, the performance measures were based on the three categories identified by Kraiger et al., (1993). These were cognitive-, skills-, and affective-based learning outcomes. Regarding the sixth category, the model states that behaviourally performance measures should be considered. In fact: "without accurate measurement of student performance, it is impossible to assess whether the desired competencies are being gained, and therefore, whether the training is effective" (Salas et al., 2009, p.566). The chosen performance measures were adapted from the study by Parker et al., (2019), which will be more explicitly discussed in the following sections. Finally, the seventh stage involves feedback to students. This is critical to allow students to correct their mistakes and learn from them. Feedback was provided through timely reminders of orders that were behind on schedule.

Measures

Focal variables. First off, affective knowledge or perceived self-efficacy was measured (note that this concept is not equal to the control variable of the same name). Affective knowledge gauges whether a person feels confident that they are more capable in a certain skill or knowledge domain (Kraiger et al., 1993). The scale developed by Schwarzer & Jerusalem (1995) was slightly adjusted in this study to specifically capture affective knowledge of work design. All items were measured on a 7-point Likert scale ranging from 'strongly disagree' to 'strongly agree'. A sample item is '*At this point... - ...I am confident in my ability to create work that motivates employees.'* The Cronbach's alpha was satisfactory (α = .78). Secondly, skills knowledge was tested by confronting students with a hypothetical case. The case required students to solve a problem that a fictional employee experienced. Participants could answer in a manner reflecting poor skills knowledge or enriched skills knowledge. Hence, skills knowledge was separated into two distinct categories. The case and scale were developed by Parker et al. (2019). All items were measured on a 5-point Likert scale ranging from 'extremely unlikely' to 'extremely likely'. One enriched answer category example is '…involve cleaners in a review of how cleaning is done,' whereas a poor answer category example is '…set strict cleaning times for each room.' The Cronbach's alpha for poor skills knowledge was unsatisfactory (α = .59), whereas the Cronbach's alpha for enriched skills knowledge was highly unsatisfactory (α = .42). For the second hypothesis, a measure was added to test students' perception of the learning experience. The measure was adapted from the Experiential Learning Survey (Clem, Mennicke & Beasle, 2014), which integrates four principles summarizing previous work on Experiential Learning. The Experiential Learning Survey adapted these principles into scales and were slightly adjusted in this study for the simulation game. All items were measured on a 7-point Likert scale ranging from 'strongly disagree' to 'strongly agree'. Respectively, a sample item for the scale *authenticity* included: 'real-world problems came up during this simulation game.'; for *active learning*: 'the simulation game required me to do more than just listen.'; for *relevance*: 'this simulation game was applicable to me and my interests.'; and for *utility*: 'this simulation game will help me do my (future) job better'. The Cronbach's alpha showed high internal consistency when calculating the average of all four scales (α = .82), with no individual scale reporting unsatisfactory reliability.

Controls. Besides learning outcomes, a number of factors were measured that could influence learning outcome results. For one, it has been found that learning outcomes can be influenced by one's belief in their own ability to learn. Specifically, the more *self-efficacy* the learner perceives in their ability to gain knowledge or learn a skill, the more knowledge is gained or the better a skill is learned (Dierdorff, Surface & Brown, 2010). All items were measured on a 7-point Likert scale ranging from 'strongly disagree' to 'strongly agree'. A sample item included 'I am confident in my ability to master new material in learning situations.' The Cronbach's alpha was satisfactory (α = .76). Additionally, a measure was adapted to account for the mediating role of *motivation to learn* (Afsar & Umrani, 2020). General motivation to learn may impact learning outcomes in the sense that students with a large number of daily responsibilities may feel overwhelmed or depressed, which may negatively impact their motivation while participating in a study (Cole, Feild & Harris, 2004). All items were measured on a 7-point Likert scale ranging from 'strongly disagree' to 'strongly agree'. A sample item included 'I will try to learn as much as I can during these tutorials,' and Cronbach's alpha was satisfactory (α = .87). A last control variable involves the *general mood* of the learner. The scale was adapted from Williams, Suls, Alliger, Learner & Wan (1991) where all items were measured on a 5-point Likert scale ranging from 'very slightly or not at all' to 'extremely'. The Cronbach's alpha was unsatisfactory for positive affect (α = .59), while it was satisfactory for negative affect (α = .73). Deleting items for positive affect did not result in any significant increase in coefficient values and would likely decrease content validity. The researcher expects the low value is caused by a discrepancy in meaning between this study's answer category 'extremely,' and 'very much' used by Williams et al. (1991).

Data collection

Data collection was done through surveys. After finishing each game, participants received a link to an online survey. The survey takes 10 minutes to complete. Although not the only purpose of the survey, its assessment of the quality of the learning experience, as well as levels of confidence and (implicit) knowledge of design principles, are of main interest to this thesis. There were measures in place to test explicit knowledge, yet these were omitted because of practical constraints. The survey was conducted after every simulation. This means every participant was asked to complete the survey twice. Each variable (including controls) required answering along a Likert-scale, with both *learning experience* and *affective knowledge* including a 7-point scale ranging from the answer categories 'strongly disagree' to 'strongly agree'. A number of example statements include '*I am motivated to learn the skills emphasized in this class'* as part of motivation to learn, '*I care about the information/insights I am being taught in this simulation game*' as part of personal relevance (subscale of learning experience), and '*I am confident in my ability to create work that motivates employees*' as part of affective knowledge. The exception variable was *skills knowledge*, which was instead measured along a 5-point Likert-scale with answer categories ranging from 'extremely unlikely' to 'extremely likely'. This deviation is due to the nature of the statements. These required respondents to indicate how likely they were to choose a design strategy given a redesign case, for instance: '*I would find a way to discretely observe the employee's behaviour to see how fast he/she is moving,'* where students would indicate the likelihood of choosing such a strategy.

Data analysis

Data analysis was conducted using the SPSS software (version 29). Every respondent who completed the questionnaire had been included in the analysis. The data were divided into a single-level and multi-level dataset, with the latter containing the two simulation games nested within participants. In the multi-level dataset data were split into two categories, the simulation of poor work design, and the simulation of enriched work design. This was done through adding a binary variable 'simulation' with values '0' and '1' for both categories. The single-level dataset was used for hypotheses 1a and 1b, while the multi-level dataset was used for hypothesis 2. First, means and standard errors of all incorporated variables were calculated, as well as the Pearson's correlations. A correlation can be considered moderate when the correlation coefficient is between .30 and .50 and can be considered strong when the correlation coefficient has a value higher than .50, although interpretations may depend on the context of the research (Nunnally, 1978). Afterward, paired-samples t-tests were carried out to identify any significant differences in means for *skills knowledge* and *affective knowledge* before, and after the simulation.

Regarding hypothesis 2, several assumptions of regression analysis were tested. Most variables were distributed normally and there was homogeneity in the variance in all dependent variables. When consulting histograms of the variables included in the regression model however, self-efficacy was found to have a major positive outlier, which can be neglected as the variable acted merely as a control variable. Similarly, a (smaller) positive outlier was found for affective knowledge around the answer category 'somewhat agree' in the post-test. Although speculative, it may be that respondents remained modest in their answers to conform to social norms that value humility. As there was no real pattern in the variance for affective knowledge, this outlier was deemed unobtrusive. All continuous independent variables were mean-centred to avoid multi-collinearity (Cohen, Cohen, West, & Aiken, 2002). In a typical Multilevel Regression Analysis (MRA), one would verify whether the analysis should have been performed by calculating the intraclass correlation coefficient (ICC) of all level 1 variables (i.e., a simulation of poor- and enriched work design). This measure determines how much variance is explained at the between- and within-person level (Robayo-Tamayo et al., 2020). However, as the variable Learning Experience (LE) was only measured once, calculating the ICC would be ineffectual as there are no within-person differences. Instead, LE was added as a covariate to the regression models. A MRA was conducted to account for an interaction effect of LE as proposed by hypothesis 2. This was considered the appropriate technique to use given that MRA considers clustering of data (simulations nested within participants), while a single regression analysis may lead to biased results (Clarke, 2008). The control variables were entered in the first step, with the main effect of a simulation of poor- and enriched work design in the second step, the learning experience in the third step, and the interaction term in the final step (Baron & Kenny, 1986). When the interaction terms were found to be significant ($p < .05$), the effects were plotted using an Excel template developed by Dawson (2014).

Quality criteria

Lastly, this section will discuss some ethical considerations. Primarily, it should be noted that the simulation was part of a course where students were obligated to appear in class. However, this obligation was in line with the learning goals of the course itself. Participation in the survey was voluntary and could be aborted at any minute. Additionally, students gave informed consent for their data to be shared with the researchers and supervisors. In the survey, students agreed to answer questions with honesty and a certain degree of seriousness. The entire survey used for this thesis can be found in the Appendix, as well as more details regarding the simulation. It is included with the aim to increase the study's reliability, in case future studies seek to replicate the method presented here. Regarding privacy, data will only be shared with those authorized to use it. Data will be anonymized to the extent that students will not be recognized except for demographical information, such as age or gender. In doing so, this project claims to be in line with ethical guidelines of scientific research. The researcher admits use of the generative AI-tool 'Chat-GPT' which was exclusively used for grammatical improvements of sentences and for inquiring into reference style requirements.[1]

Results

Descriptive statistics. Table 1 shows descriptive statistics of all included variables, whereas Table 2 includes correlations between those variables.

Table 1

Descriptive statistics

Variable	Mean	SD	Range
Years of working experience	4.23	2.14	10
Average working hours (per month)	41.52	32.51	240
Positive affect	3.34	.54	3.25
Negative affect	2.11	.73	3.00
Motivation to learn	5.69	.73	3.50
Self efficacy	5.79	.69	4.33
Authenticity (LE)	4.53	1.18	5.75
Active Learning (LE)	4.76	1.29	5.75
Personal Relevance (LE)	4.38	1.29	6.00
Utility (LE)	4.40	1.19	5.25
Affective knowledge (pre)	4.73	.72	4.00
Affective knowledge (post)	4.63	.92	5.50
Enriched skills knowledge (pre)	4.02	.61	2.33

[1] Prompt examples: (1) 'Please improve … (insert sentence)'. (2) 'Is the conclusion written in present tense?'

Enriched skills knowledge (post)	4.21	.62	3.67
Poor skills knowledge (pre)	2.81	.72	3.25
Poor skills knowledge (post)	3.21	.70	3.75
Affective knowledge (combined)	4.68	.82	5.50
Enriched skills knowledge (combined)	4.11	.62	3.67
Poor skills knowledge (combined)	3.01	.74	3.75
Learning experience (combined)	4.52	1.09	5.19

Table 2

Correlation between working experience, working hours (per month), control-, and focal variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Positive affect	-												
2. Negative affect	-.14	-											
3. Motivation	.31**	-.12	-										
4. Self efficacy	.15	-.40**	.16	-									
5. Affective knowledge (pre)	.11	.01	.22*	.27**	-								
6. Affective knowledge (post_	.03	-.09	.18*	28**	.35**	-							
7. Enriched skills knowledge (pre)	.08	.07	.18*	.13	.06	.16	-						
8. Poor skills knowledge (pre)	.11	.10	.10	-.07	.01	-.05	-.34**	-					
9. Enriched skills knowledge (post)	.00	-.08	.28**	.20*	-.19	.37**	.22*	-.20*	-				
10. Poor skills knowledge (post)	.11	.09	.10	.02	.02	.14	-.15	.44**	.10	-			
11. Learning experience	.05	-.02	.27**	-.03	.01	.29**	.03	-.18*	.31**	.01	-		
12. Working experience	.00	-.04	-.16	.08	.06	.10	-.60	.08	-.12	.09	.02	-	

13.Working hours (per month)	-.03	-.05	-.17	.01	-.20*	-.05	-.13	.01	-.00	.12	-.07	.31**	-

Note: * $p < .05$, ** $p < .01$

Hypothesis testing. Furthermore, the hypotheses including the focal variables of this thesis were tested. First hypotheses 1a and 1b were tested with the use of a paired-samples t-test. Its results are displayed in Table 3.

Table 3

Paired Samples Test

		Mean	Std. Dev.	S.E. mean	Paired *t* test		
					t	df	Sig (two-tailed)
Pair 1	Affective knowledge (pre) Affective knowledge (post)	.10	.94	.08	1.20	130	.23
Pair 2	Enriched skills knowledge (pre) Enriched skills knowledge (post)	-.20	.77	.07	-2.92	130	.00*
Pair 3	Poor skills knowledge (pre) Poor skills knowledge (post)	-.40	.76	.07	-6.12	130	.00*

Note: * $p < .05$

Hypothesis 1a did not receive support, whereas 1b did partially receive support. First, within-group means for affective knowledge were lower in the pre-test ($M = 4.73$, $SD = .72$), when compared to the post-test ($M = 4.63$, $SD = .92$). Although this indicates an effect opposite to that expected based on hypothesis 1a, it was found not to be significant ($t = 1{,}20$, $p = .23$). Furthermore, poor skills knowledge was higher for the post-test measure ($M = 3.21$, $SD = .70$), than the pre-test measure ($M = 2.81$, $SD = .72$). In contrast to affective knowledge, this increase was found to be significant ($t = -6.120$, $p < .01$). As expected, enriched skills knowledge was lower in the pre-test ($M = 4{,}02$, $SD = .61$) compared to the post-test ($M = 4{,}21$, $SD = .62$). This increase was found to be significant ($t = -2.92$, $p < .01$). However, it should be noted that the latter variable's correlation between the pre- and post-test was rather low. Hypothesis two stated that the learning experience was expected to moderate the ability of a simulation game to increase levels of affective- and skills knowledge. The results of the multiple regression analysis, which included the dependent variables related to affective- and skills knowledge, can be found in Table 3. Since the interaction effect for all three dependent variables was significant, this table merely includes the final regression models.

Table 3

Fourth MRA model: dependent variables predicted by control variables and interaction effect

	Affective knowledge				*Enriched skills knowledge*				*Poor skills knowledge*			
	β	SE	*t* value	*p* value	β	SE	*t* value	*p* value	β	SE	*t* value	*p* value
Intercept	2.21	.52	4.24	.00*	4.00	.05	79.10	.00*	2.80	.06	46.07	.00*
Positive affect	-.05	.08	-.61	.82	-.05	.08	-.61	.55	.14	.10	1.39	.17
Negative affect	.07	.06	1.20	.21	.07	.06	1.20	.23	.10	.08	1.37	.17
Motivation to learn	.16	.06	2.68	.08	.16	.06	2.68	.01*	.10	.08	1.22	.23
Self efficacy	.16	.06	2.56	.00*	.16	.06	2.56	.01*	-.02	.08	-.27	.79
Simulation	.20	.07	3.01	.21	.20	.07	3.01	.00*	.41	.07	6.24	.00*
LE	-.01	.05	-.11	.88	-.01	.05	-.11	.91	-.14	.06	-2.40	.02*
Interaction effect (Simulation * LE)	.16	.06	2.64	.00*	.16	.06	2.64	.01*	.12	.06	2.04	.04*
(-)2*LLR	586.02				451.36				524.3			
Δ-2*LLR	-10.52				-6.77				8			
									-4.08			

Note: * $p < .05$

It seems hypothesis two received full support. In a preliminary model with only control variables, it was found that affective knowledge was positively predicted by self-efficacy (β = .34, *SE* = .09, $p < .01$), and motivation to learn (β = .19, *SE* = .08, $p = .02$). Enriched skills knowledge was similarly influenced by self-efficacy (β = .15, *SE* = .06, $p < .01$), and motivation to learn (β = .19, *SE* = .06, $p < .01$). No significant effect of general mood was found however, neither for positive nor negative affect. This could be explained by the fact that positive affect ratings were average and negative affect ratings were rather low (see Table 1), perhaps reflecting a relatively ‘neutral’ emotional state of students. A second model that accounted for the simulation of poor- and enriched work design, positively predicted both poor- (β = .41, *SE* = .07, $p < .01$), as well as enriched skills knowledge (β = .20, *SE* = .07, $p < .01$). A third model including learning experience quality (LE) showed no novel results, except that motivation to learn no longer positively predicted affective knowledge. Finally, a fourth model included the interaction effect between the simulation and LE and was found significant for affective knowledge (β = .24, *SE* = .07, $p < .01$), enriched skills knowledge (β = .16, *SE* = .06, $p < .01$), and poor skills knowledge (β = .12, *SE* = .06, $p = .04$). To interpret the two-way interaction effects, their results were plotted (see figure 2, 3 and 4).

Figure 2. Regression plot for the interaction effect between a simulation of poor- and enriched work design, and dependent variable affective knowledge, while controlling for learning experience (LE).

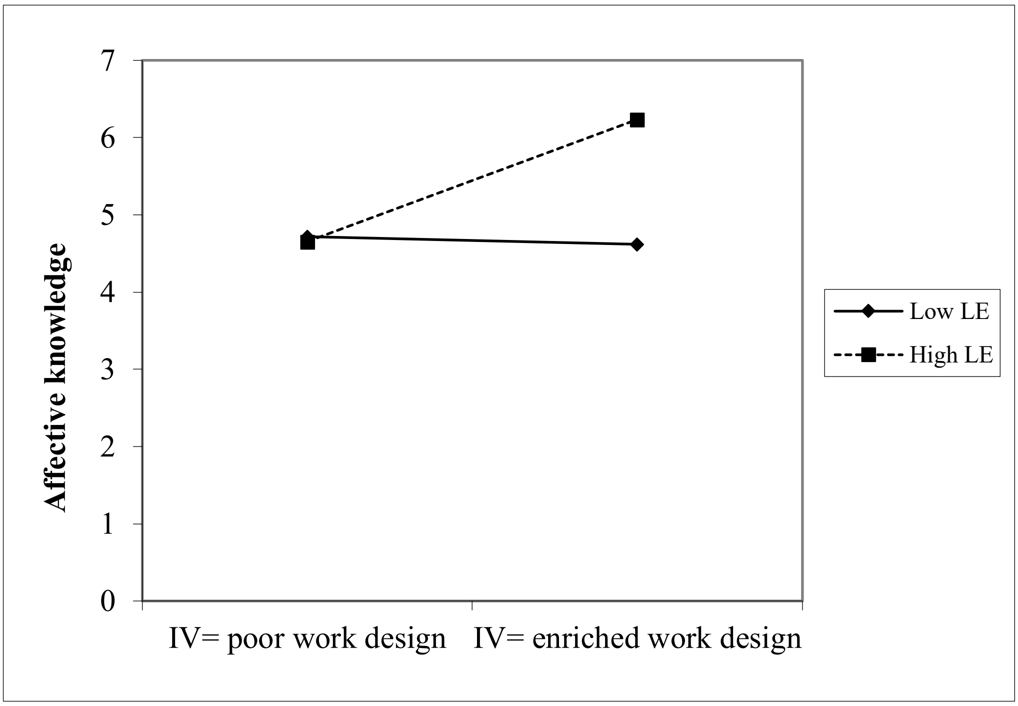


Figure 3. Regression plot for the interaction effect between a simulation of poor- and enriched work design, and dependent variable enriched skills knowledge, while controlling for learning experience (LE).

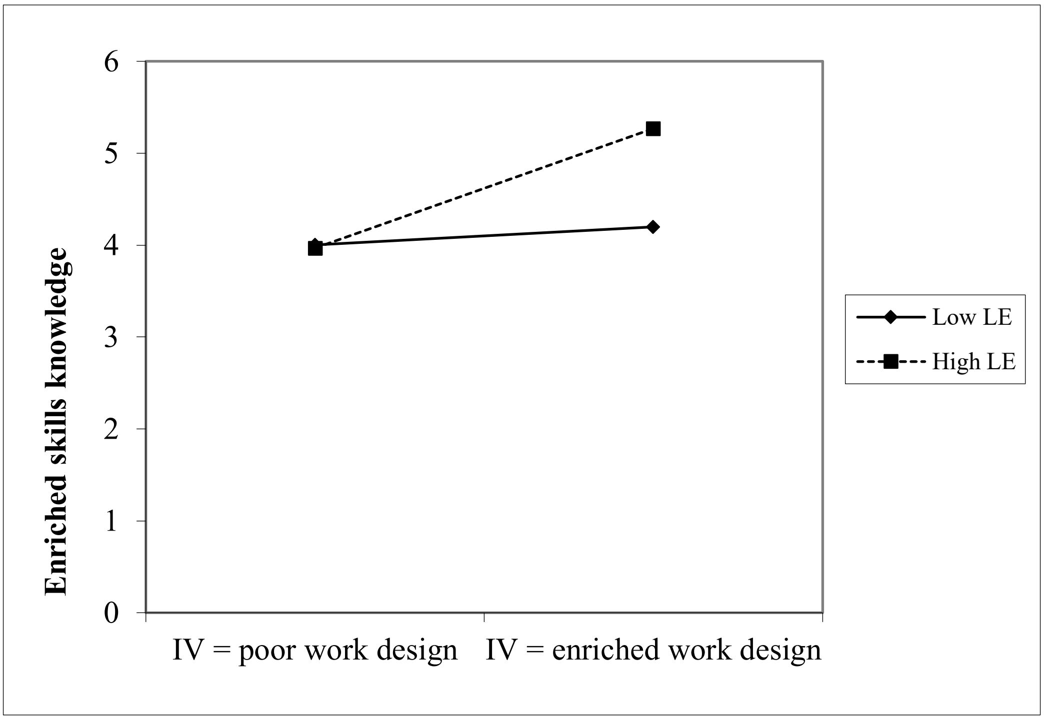
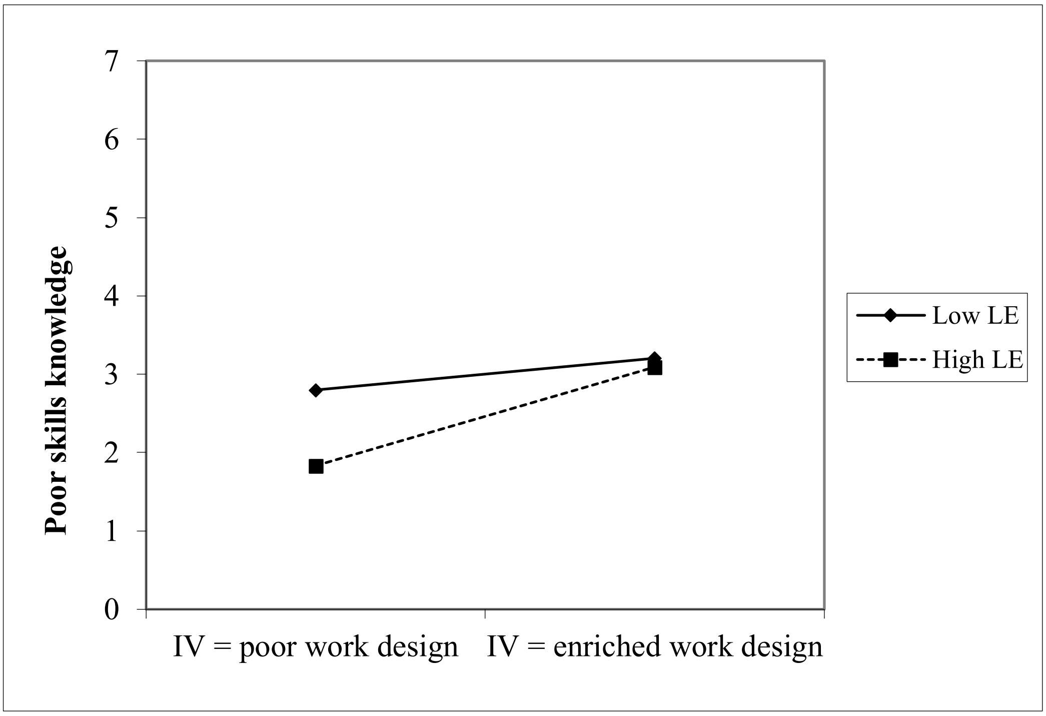


Figure 4. Regression plot for the interaction effect between a simulation of poor- and enriched work design, and dependent variable poor skills knowledge, while controlling for learning experience (LE).



When interpreting the interaction effects, several conclusions can be drawn. If LE quality was low, both the t-test and figure 2 show a negligible decrease in affective knowledge, when comparing a simulation of poor- and enriched work design. In other words, an increase in one's confidence in the ability to design work. On the other hand, if LE quality was high, there was a significant positive increase in affective knowledge. Enriched skills knowledge performed similar in terms of a significant increase if LE quality was high (see figure 3). The most striking difference here is an increase of enriched design knowledge, regardless of LE quality. Finally, a significant increase was found regarding poor skills knowledge. Unlike with the other dependent variables, poor skills knowledge levels converged in the simulation with enriched work design (see figure 4). Thus, a moderating effect of learning experience was found for all dependent variables.

Discussion

In spite of an abundance of work design theories and their intended effects on practice, their impact remains questionable as poor designs seem to persist in EU jobs (Eurofound, 2016; 2020). Experiential Learning Theory (Kolb, 1984) illustrates how learning, the creation of knowledge, requires gaining experience on the subject. Yet, education on work design tends to neglect this necessity. A promising solution involves the method of simulation-based training (Salas et al., 2009), which this thesis applied to instruct inexperienced students of work design in Dutch management education.

H1a tested the learning outcome affective knowledge, which consists of the level of confidence in one's ability to design proper work. The measure was expected to increase significantly after a simulation of enriched work design, compared to a simulation of poor work design. Overall, hypothesis 1a did not receive support as student ratings remained similar although slightly decreasing. The slight decrease could be explained by Goal Orientation theory, which states that learners may display behaviours of mediocrity when confidence in mastery of a specific skill set is rather low (Dierdorff et al., 2010). This entails that learners view the task at hand as likely involving negative feedback on their performance. Hence, they want to avoid such feedback and remain passive as a form of self-protection. Affective knowledge levels were deemed realistic at the start and did not see significant change, which may explain why the difference was insignificant. Regardless, students may have felt a slight disruption due to the challenges offered to them by the game.

H1b tested whether students made more informed choices after experiencing enriched work design for themselves. This was the case, leaving hypothesis 1b supported. However, the number of simplified ratings increased as well. This means participants opted more often for a strategy that blamed the individual for problems when they were not expected to. This latter result contradicts the findings of previous work on work design behaviour (Parker et al., 2019; Campion & Stevens, 1991). These studies concluded that individuals without any knowledge of design generally tend to design simplified work. The current study found the inverse, namely that simplified work design *increased* after the simulation. The main cause for these results may be instruments used to measure skills knowledge, as internal reliability was found to be unsatisfactory. The scales were likely flawed because of two reasons. First, the measurement was adapted from knowledge tests by Parker et al. (2019). Their study sought to explain participants' design behaviour. Although design behaviour may reflect implicit knowledge of work design conceptually, their measurements were designed for different purposes. It was deemed most appropriate however, given it was the only measure known available to serve as a measurement of design knowledge. Another reason may be that knowledge tests are usually applied when learning declarative knowledge (i.e. facts). When training involves knowledge that requires learning a skill, studies may want to find an alternative such as observational ratings (Salas et al., 2009). With this many students to observe however, it would be challenging to implement such a measure within the confines of the course's learning goals. An explaining factor could be that in the current sample, 80% of the students were employed and reported to have had (on average) 4 years of working experience. This means the students may not exactly fall under the classification of naïve designers (Campion & Stevens, 1991). However, many participants worked part-time jobs and were not asked about the degree of autonomy experienced in their own work, therefore making any conclusion difficult.

Another aspect of the research question was the interconnection between knowledge levels and the quality of the simulation's learning experience. Based on the propositions of the ELT framework (Kolb, 1984), it was expected that a simulation of enriched work design would increase knowledge levels in the case of a high-quality learning experience. The accompanying assumption was that such a learning experience would be more likely present in enriched work design because errors in such cases can be detected and rectified sooner (Achterbergh & Vriens, 2019). Regression plots showed that, after the simulation of both poor and enriched work design, significant differences in affective- and skills knowledge were present. Students indeed reported to be significantly more confident in their abilities to design work after the 'enriched' simulation, because of a high-quality learning experience. This effect was present for poor skills knowledge as well. However, given that the p value of poor skills knowledge ($p = .044$) was rather close to the threshold ($p < .05$), the researcher acknowledges that the probability of a Type-1 error increases. This means that H2 (in part) may have been falsely supported. However, as all three interaction effects were significant, there is sufficient evidence to state that a high learning experience does influence the relationship between a simulation and its learning outcomes.

Aside from learning outcomes, control variables behaved mostly in ways that were consistent with previous research, although correlations were not high in most cases. One may recall that self-efficacy referred to a more general sense of confidence in the ability to perform an action (Bandura, 1977), different from the self-efficacy concept described earlier. Consistent with past research (Cole, Feild & Harris, 2004), general mood was found to positively correlate with perceived self-efficacy. Learners are generally sceptic about their ability to learn if they are preoccupied with other things (or are emotionally troubled). Similarly, a positive mood may boost the learner's confidence in their ability to learn. Furthermore, motivation to learn had a positive effect when accounting for control variables and the simulation, which is in line with Self-Determination Theory (Deci & Ryan, 1980). This theory poses that initial intrinsic motivation to learn means learners are more likely to engage deeply with the learning material. However, the effect seized to be significant when accounting for the learning experience. From an ELT perspective, this is probably because true learning occurs when the learner undergoes the four stages (concrete experience, reflective observation, abstract conceptualization, and active experimentation), which means less weight is then put on the initial effect of intrinsic motivation (Kolb, 1984).

Theoretically, this thesis contributes to prior research by examining the relation between experiential learning (Kolb, 1984) and simulation-based training (Salas et al., 2009). It has been proposed that learning through a business simulation can be categorized into three types: cognitive, skill based and affective (Kraiger et al., 1993). The results of this thesis provide proof for this proposition at least partly. The simulation employed in this study involved both behavioural and affective learning outcomes, demonstrating significant differences in behavioural learning. However, the results were mixed, which corresponds with accounts from other studies regarding behavioural learning (Faria, 2001). Additionally, this study integrated both poor- and enriched work design elements in a simulation game. Its findings indicate a positive effect of work design on the quality of learning, which is consistent with accounts of previous motivational theories (Holman et al., 2012). Finally, this study strengthens the proposition that learning outcomes may be affected by motivational pathways. Motivational pathways explore how intrinsic motivation, self-efficacy and goal setting may indirectly influence learning outcomes (Bell & Kozlowski, 2008). Indeed, intrinsic motivation to learn and self-efficacy were found to positively influence two out of three learning outcomes measured in this study. This thesis' main practical contribution includes the prospect of a method to be used as a learning tool in management education. It could be of particular interest to educators seeking a tool to instruct work design principles. In that case, educators would do best by following the guidelines provided by Salas et al. (2009). For example, they may want to assess whether the simulation game presented here fits the subject to be learned as well as the students' needs. Besides management education, the simulation game may also be used by businesses to instruct their employees or clients with knowledge of work design.

In terms of limitations, one of the main drawbacks of this thesis' research design was its sole focus on students, and thus its lack of comparability with other target groups. Here, studies could think of including groups that are employed full-time, or as Parker et al. (2019) suggest, investigate how distinct experience and training leads to differences in learning outcomes. Other considerations could involve comparing the learning outcomes of a simulation with other education methods, such as a case-study approach. Related to the problem of comparability was learning experience quality only being measured once. This meant data analysis for the second hypothesis was complicated, as it became difficult to compare results between pre- and post-test measures. What is more, educators or businesses that consider adapting the simulation could improve on the game in a number of ways. First, one could consider reducing the game's complexity. For example, by reducing the number of materials needed for the game, or by instead using reusable materials. A useful guiding principle would be the consideration of cognitive complexity:

> "Given that management tasks are often not heavily dependent on any physical equipment or particular settings, but instead are heavily decision-making and judgment-based, it is more crucial that any SBT designed for management education appropriately represents the information-processing demands of the simulated situation than the mundane environmental aspects (e.g., conference room furniture)" (Salas et al., 2009, p.569).

Finally, several constructs had to be shortened or omitted out of practical necessity. The most relevant example included exclusion of cognitive learning outcomes. Although they were the least important type of knowledge to this study, it is suggested for simulations to incorporate all three outcomes simultaneously (Salas et al., 2009). Others were not excluded but required a reduction of the number of items, such the general self-efficacy control variable, which was shortened to four items instead of the proposed ten items by Schwarzer & Jerusalem (1995), possibly decreasing content validity.

First, it is suggested for future research to develop more appropriate evaluation methods for measuring work design knowledge. The results of this study were in part restricted by its application of instruments measuring hypothetical cases of work design behaviour, not knowledge. This was necessary however, given the absence of any measurements related to work design knowledge. Second, simulations involving work design should consider including other aspects of work design. An example includes replacing individual-level measurements with team-level measurements, to account for competitiveness between teams. Examples may also include non-work design variables, such as instructor involvement (Faria, 2001). A third aspect worthy of further research involves so-called 'willingness' variables (cf. figure 1 in Parker et al., 2019). Especially if the simulation only involves a handful of participants, then studies could consider including personal characteristics of the learner. For example, one could question whether individuals either conservative or open to change are more likely to see the benefits of enriched work design, and would therefore differ in their need for design knowledge (Parker et al., 2019).

Conclusion

Simulations are often regarded as a pathway to creating artificial environments where participants are actively engaged with learning about a certain topic. Given that individuals increasingly require work design skills in today's increasingly complex business environment, we may require new ways of instructing students, employees, and managers with design knowledge. However, past research tends to be sceptical about the effectiveness of simulations in imparting such knowledge. The framework presented here adapted the 'learning by doing' approach typical of simulation-based training, integrated with several learning outcomes, to provide evidence for their use. This thesis hopes to lay the foundation for future research on simulations and their place within the context of work design.

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Appendix A

Elements of the survey used in this study

Personal code
Used to link all surveys

Role in the game

- Managing Director
- Planner
- Production Manager
- Maintenance Technician
- Quality Controller
- Team Leader
- Team Member
- Other, namely

Controls

Demographics

1. Age
2. Gender
3. Nationality
4. Working experience (years)
5. Educational programme?
6. How many years of working experience?
7. Current function?
8. Number of working hours?
9. Sector?

Motivation to learn

1. I will try to learn as much as I can during this class.
2. I am motivated to learn the skills emphasized in this class.
3. I am willing to exert considerable effort in this class in order to improve my skills.
4. I am looking forward to develop new skills and knowledge during this class.

Learning self-efficacy

1. I am confident in my ability to master new material in learning situations.
2. I am confident in my ability to perform a task or activity after receiving instruction on that task/activity.
3. I trust my learning abilities.

General mood (PA & NA)

At this moment, I feel:

1. Interested
2. Happy
3. Alert
4. Excited
5. Distressed
6. Irritable
7. Angry
8. Nervous

Learning experience

Authenticity (of the game)

1. The setting where I learn helps me understand the material better.
2. I expect real-world problems to come up during this learning experience.
3. The environment I learn in does not enhance the learning experience.

Active Learning

4. I am stimulated by what I am learning.
5. The learning experience requires me to do more than just listen.
6. I feel like I am an active part of the learning experience.

Personal Relevance

7. This learning experience is enjoyable to me.
8. This learning experience is applicable to me and my interests.
9. This learning experience falls in line with my interests.

Utility

10. This learning experience will help me do my job better.
11. This learning experience will not be useful to me in the future.
12. I can see value in this learning experience.

Work design knowledge

Affective knowledge

1. I am confident in my ability to create good work design.
2. I can usually find several solutions when I have to solve a case study on work design.
3. I can always manage to solve difficult problems on work design.
4. Thanks to my resourcefulness, I know how to solve problems on work design.

Skills knowledge

Version 1

Sasha works in the warehouse for an online company. Their job is to fill the online orders. After clocking in, Sasha logs into the hand-held device they use. They are informed of an item that has to be gathered from the warehouse, as well as how long this is expected to take. Sasha then moves quickly, sometimes running, to get the item and take it to dispatch. They receive feedback as to whether they meet the time allocated or not. Sasha repeats this process about 15 times per day. About 50% of the time, Sasha's response is slower than the time that has been allocated for the task.

Imagine it is your role to address this situation. How likely would you be to do any of the following on a scale from 1 (extremely unlikely) to 5 (extremely likely):

I would...

1. ... involve the employee and their colleagues in a review to identify ways in which their work could be organised better. (EWSS_S2_1)
2. ... try to reorganise the work so that tasks do not need to be timed. (EWSS_S2_2)
3. ... try to redesign the jobs so that the employee and their colleagues have more meaningful work. (EWSS_S2_3)
4. ... change the selection system so that we only hire people who are physically fit. (PFSS_S2_1)
5. ... find a way to discretely observe the employee's behaviour to see how fast he/she is moving. (PFSS_S2_2)
6. ... advise the employee to improve his/her physical fitness. (PFSS_S2_3)
7. ... give the employee and their colleagues a bonus when they meet the allocated times. (PFSS_S2_4)

Version 2

A luxury hotel is under financial pressure. Cleaning costs for the hotel are higher than at comparable hotels. Most cleaners have been employed at the hotel a long time. They are paid a wage that is average in the industry.

Imagine it is your role to address this situation. How likely would you be to do any of the following on a scale from 1 (extremely unlikely) to 5 (extremely likely):

I would…

1. …identify the slowest cleaners and lay them off.
2. …involve cleaners in a review of how cleaning is done.
3. …set strict cleaning times for each room.
4. …ask cleaners for their ideas on how to save cleaning costs.
5. …have staff clock in and out to ensure they are working the full day.
6. …introduce a bonus for staff who clean fastest.
7. … reorganize the work to be more efficient based on cleaners' suggestions.

Honest answers

It is important for our research to only include responses from participants that devoted their full attention and did not answer randomly to the questions or made false claims. **In your honest opinion, should we use your data in our analyses in this study?**

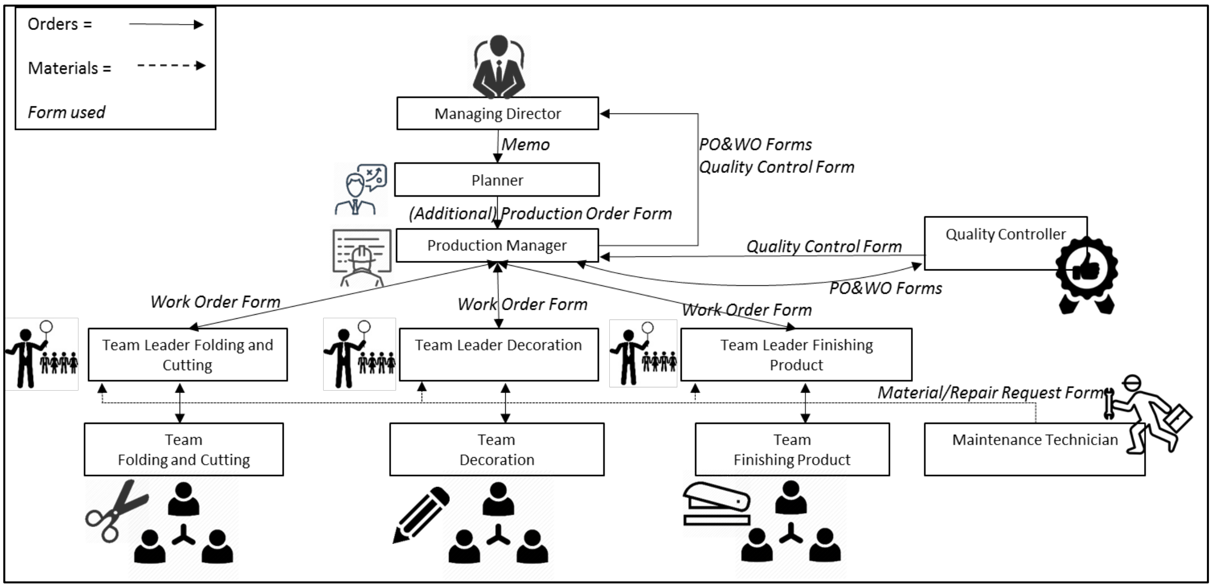
YES, I carefully read all questions and tried to answer everything honestly. (1)
NO, I just clicked randomly through the whole survey. (0)

Appendix B

Supplementary details explaining a simulation of poor- and enriched work design

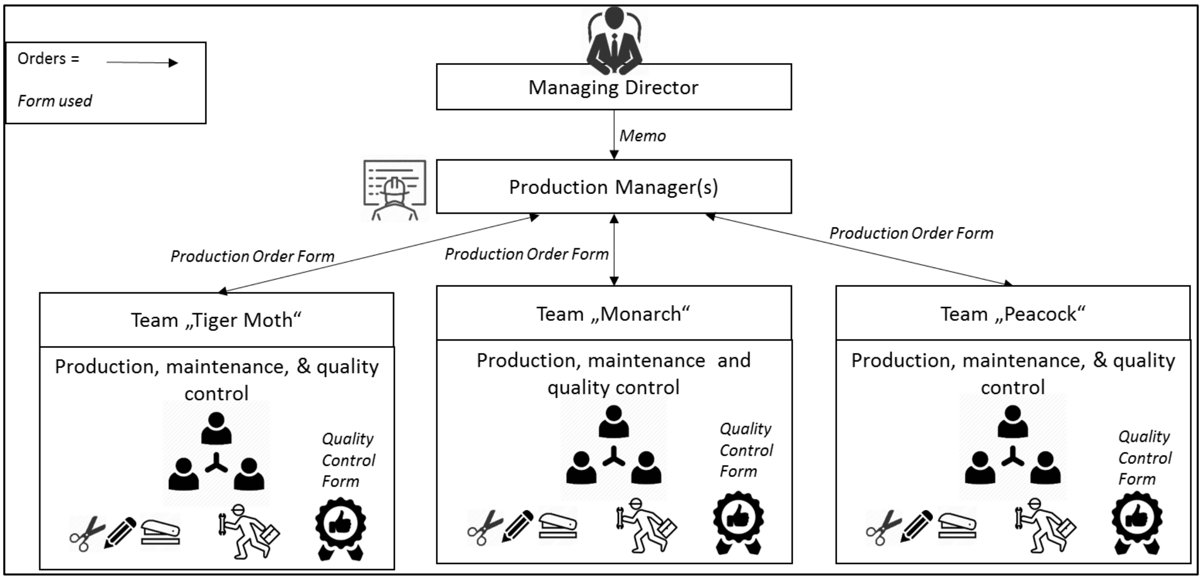
In the bureaucratic organisation, work is organized hierarchically, with a Managing Director, a Planner, a Quality Controller, a Maintenance Technician, a Production Manager, a Team Leader Folding and Cutting, a Team Leader Decorating, a Team Leader Finishing Product, and three production teams, with each team responsible for one task (respectively for each team: (1) folding and cutting, (2) decorating, (3) stapling (see figure 5).

Figure 5. Room layout and flow chart bureaucratic organisational structure.



In the flexible organization, work is less hierarchically organized. Its participants consisting of a Managing Director, one or two Production Managers, and three self-managing teams (named Team Tiger Moth, Monarch, and Peacock). These teams are not assigned specific tasks. Instead, teams have quality control jobs, maintenance jobs, leading jobs, and production jobs. In contrast to the bureaucratic structure, workers could assign themselves tasks in the flexible structure. This allowed for job enrichment/enlargement behaviors. Additionally, there were given more autonomy by being allowed to finish the entire product from start to finish (see figure 6).

Figure 6. Room layout and flow chart flexible organisational structure.



Orders =
Form used
Managing Director
Memo
Production Manager(s)
Production Order Form
Production Order Form
Production Order Form
Team „Tiger Moth“
Production, maintenance, & quality control
Quality Control Form
Team „Monarch“
Production, maintenance and quality control
Quality Control Form
Team „Peacock“
Production, maintenance, & quality control
Quality Control Form