

Master Thesis

Digital Game-based Learning: How Goal-oriented Instruction and Intrinsic Motivation

Affect Deep Learning.

C.T. Lahaye

5924588

Educational Sciences

Faculty of Social Sciences

Utrecht University

Supervised by Dr. P.J.M. Wouters

Second assessor Dr. G.S.E. van den Broek

June 6, 2019

Word count: 7306

Abstract

Few studies have investigated the integration of digital games in learning contexts. One way of integrating Digital Game-based Learning [DGBL] into the learning context is to provide instructions about the objectives of playing the game. Although research indicates that this form of instruction increases deep learning, the effect of instruction is not yet fully understood. The aim of this study is to investigate how the relationship between mastery-oriented instruction and deep learning is mediated by intrinsic learning motivation in DGBL environments. Therefore ($n = 103$) students, aged 16-25, participated in an experimental mixed design study with a pre-test and post-test in three conditions. The control condition did not receive instruction whereas the experimental conditions received either a performance or mastery goal-oriented instruction. The results show no relationships between goal-oriented instruction type and deep learning. The results suggest a negative trend for performance goal-oriented instruction on intrinsic learning motivation. However, further research is needed to confirm this. A significant relationship is found between intrinsic learning motivation and deep learning. Which indicates that educators should aim to increase intrinsic learning motivation of students in DGBL environments. The intrinsic learning motivation of students positively impacts deep learning.

Keywords: Digital Game-based Learning Environments, Mastery Goal-oriented Instruction, Performance Goal-oriented Instruction, Intrinsic Motivation.

Digital Game-based Learning:

How Goal-oriented Instruction and Intrinsic Motivation Affect Deep Learning.

Using playful elements for educational purposes is not new. Due to increasing popularity of digital games, educationalists wonder how digital games may benefit education (Plass, Homer & Kinzer, 2015). Learning environments that use computer games are referred to as digital game-based learning [DGBL] environments. The number of empirical studies investigating the effectiveness of DGBL environments has proliferated (Wouters & van Oostendorp, 2017). Educationalists strive to design learning environments that stimulate high quality learning, which results in long-term retention and the ability to use knowledge for problem-solving in unfamiliar settings. The question of how to design DGBL environments so that they stimulate high quality learning is still subjected to much debate. Therefore, teachers continue to struggle with the use of digital games during their lessons (Van Eck, 2006; Baek, 2008).

Many researchers have tried to make DGBL environments more effective. There is a multitude of research into the effectiveness of adapting and adding features to games (e.g. adapting the game to players' performance, adding surprising events to update players' mental models and adding digital pedagogical agents to guide players' learning) (Erhel & Jamet, 2016). Recently, the attention for the combination of digital games and other instructional methods has increased. Vandercruysse and Elen (2017) refer to this as context integration. Context integration influences the outcome of DGBL. Two teachers may use the same DGBL environment for different objectives, achieving different results (Vandercruysse & Elen, 2017). Learning contexts are shaped by physical environments (e.g. classrooms), how DGBL is presented to students, educator's goals and integration into the curriculum (Vandercruysse & Elen, 2017). The context

integration of DGBL environments leads to higher quality learning (Wouters & Van Oostendorp, 2017). Furthermore, Young and colleagues (2012) concluded that “games cannot succeed as stand-alone solutions to education” (p.83), emphasising the need to combine DGBL environments with other instructional techniques.

A promising combination is that of DGBL environments and instructions on what is relevant within DGBL environments (Erhel & Jamet, 2016). Relevance instructions affect learners’ goals and the strategies they use to process information (McCradden, Magliano & Schraw, 2010). More specifically, Erhel and Jamet (2016) found that instructions about the goal of gameplay positively affect how learners process information during gameplay. These ‘goal-oriented instructions’ [GOI] are thus believed to improve high quality learning in DGBL environments.

However, research into this subject is scarce. It is therefore desirable to further explore how the quality of learning in game-based environments is affected by GOI. Also largely unexplored is how motivation relates to the combination of DGBL environments and other instructional methods. This is surprising as motivation is seen as an important aspect of learning. Intrinsic motivation is commonly thought to increase high quality learning (Chin & Brown, 2000). It is therefore important to explore the relationship between (intrinsic) motivation and high quality learning in DGBL environments. More so because one of DGBL’s promising features is that it motivates learners to engage with the learning content (Kiili, 2005). Exploration of these subjects contributes to better scientific insight into how context integration affects DGBL. It connects insight into motivational aspects of DGBL to context integration and instruction. Furthermore, it increases much-needed attention to context integration of DGBL

environments and ensures that DGBL environments are better used in classrooms. This is because educationalists will be better equipped to effectively use DGBL in classroom settings.

Digital game-based learning

DGBL environments use entertaining qualities of digital games to induce acquisition of competencies and skills (Pivec, 2007), to teach, train, inform or persuade (Ter Vrugte, 2016). DGBL environments are interactive environments, based on a set of rules and constraints, providing immediate feedback and directed towards a clear goal (Wouters & Van Oostendorp, 2013). Although frequently present, competition and narrative are no prerequisite (Wouters & Van Oostendorp, 2013).

The quality of learning in digital games

DGBL is thought to stimulate analysis and evaluation of situations and consequences of decisions, thereby inducing high-quality cognitive learning (Ter Vrugte, 2016). Many studies have evaluated the effectiveness of DGBL. Comparing DGBL to conventional learning media has yielded contradicting results. Connolly, Boyle, MacArthur, Hainey and Boyle (2012) concluded there is no convincing evidence that DGBL is more effective than conventional media. By contrast, Wouters, Van Nimwegen, Van Oostendorp and Van der Spek (2013) showed that, for learning and retention, DGBL is more effective than conventional media. These contradictions may be explained by different operationalizations of learning. Defining learning gains differently may lead to different research findings. Emphasis has therefore shifted to the effect of DGBL on the quality of learning (Erhel & Jamet, 2016).

To determine the quality of learning, a distinction can be made between surface learning and deep learning (Kester, Kirschner & Corbalan, 2007). Surface learning is related to the

memorization of facts and reproduction of knowledge because the learner feels required to gain this knowledge. This new knowledge is therefore isolated from other knowledge and real-life experiences. Deep learning, by contrast, refers to seeking understanding of the meaning of learning material, relating new ideas to previous knowledge and real-life experiences (Chin & Brown, 2000). This form of learning leads to long-term retention and makes knowledge useable for problem-solving in unfamiliar settings (Kester, Kirschner & Corbalan, 2007). Learning can therefore be seen as an active process in which the learner makes an effort to process information in a way that integrates new knowledge with prior knowledge and experiences.

However, the human brain has only limited capacity to process information (Mayer & Johnson, 2010). For deep learning to occur, it is important that enough cognitive capacity is reserved for the processing of relevant knowledge. Not all game-features contribute to cognitive processing of relevant knowledge. Entertainment features may absorb large parts of learners' limited cognitive processing capacity, leaving insufficient cognitive capacity to process the educational content of games (Mayer & Johnson, 2010). Consequently, it is important to understand how specific game-features contribute to effective cognitive processing that allows for deep learning to take place.

Information processing is affected by personal intentions as well as instructions (McCradden et al., 2010). McCradden and colleagues (2010) find that readers' goals and processing strategies are affected by pre-reading instructions on relevance. Along those lines, Erhel and Jamet (2016) argue that pre-gaming instructions may be a promising instructional method to increase deep learning in DGBL environments. Furthermore, Young and colleagues (2012) contend that DGBL environments are only effectively utilized when integrated in the

learning context. Instructional support should thus help to select information that is relevant to a broader learning context such as a lesson or the curriculum. Also, combining DGBL with other instructional methods stimulates learners to explicate new knowledge and it increases deep learning (Wouters & Van Oostendorp (2017). It becomes evident that there is a need for research into the effect of pre-gaming instructions on deep learning in DGBL environments.

Relevance instructions

Learners with specific goals in mind during an activity reach higher learning outcomes and use more advanced processing strategies (Erhel & Jamet, 2016). Learning without a goal in problem-solving situations decreases learning outcomes (Vollmeyer & Burns, 2002). Especially for computer-based learning, goal-orientation can affect strategy use and instructional efficiency (Künsting, Wirth & Paas, 2011) because clear goals lead to more active experimentation and reflection (Kiili, 2005). These are instructions on what is relevant in the DGBL environment.

Goal-oriented instruction [GOI] revolves around setting a goal that influences the behaviour of learners in achievement settings (Linnenbrink-Garcia, Tyson & Patall, 2008). Literature on achievement goals is extensive (e.g., Dweck, 1986; Nicholls, 1984). Two types of achievement goals are commonly distinguished (Darnon, Butera & Harackiewicz, 2007). Mastery goals refer to the desire for understanding, skill development and mastery of new knowledge. Mastery goal-oriented learners are likely to recognise the value of learning because learning helps to increase knowledge and skills (Bouffard, Boisvert, Vezeau & Larouche, 1995). Performance goals refer to the desire to show competencies and abilities (e.g., achieving the highest score). Senko and Miles (2007) argue that performance goals, opposed to mastery goals, are generally unrelated to high course interest and deep learning strategies. Deep-processing is

the result of a mastery goal-orientation whereas a performance goal-orientation results in more superficial processing of tasks (Nolen, 1988; Elliot, McGregor & Gable, 1999). Achievement goal type also influences the extent to which self-regulation is exhibited (Bouffard, Boisvert, Vezneau & Larouche, 1995). Self regulation is seen as an important prerequisite for high quality learning (Schraw, Crippen & Hartley, 2006). Furthermore, mastery goals promote the use of deep learning strategies (Ames & Archer, 1988; Valle, Cabanach Núñez, González-Pienda, Rodríguez, & Piñeiro, 2003), by which parts of new knowledge are related to each other and the learners' prior knowledge (Vermunt & Vermetten, 2004)

Research on the effect of GOI on deep learning in DGBL environments is scarce. Erhel and Jamet (2016) show that mastery GOI in DGBL leads to deeper processing of educational material than performance GOI. However, the relationship between GOI and deep learning in DGBL environments is not entirely understood. Erhel and Jamet (2016) conclude that future research should include intrinsic motivation in the framework of GOI and deep learning. Achievement goals are commonly related to an increase in intrinsic motivation (Heyman & Dweck 1992). Ames (1992) found that children who were at risk of losing their intrinsic motivation, remained intrinsically motivated after receiving an intervention that focussed on learning goals. Furthermore, mastery goals positively affect intrinsic motivation (Rawsthorne & Elliot, 1999). Whereas intrinsic motivation is thought to increase learning outcomes (Prensky, 2001).

Intrinsic Motivation

Motivation is an internal process that gives purposeful direction and persistence to behaviour (Lee, Cheung & Chen, 2005). Although different typologies of motivation exist, a

division between intrinsic and extrinsic motivation is common. Extrinsic motivation is the drive to perform externally promoted behavior or to follow externally imposed restrictions (Hennessey, Moran, Altringer & Amabile, 2015). Intrinsic motivation is the drive to do something for the pleasure of the task (Deci, 1971); the task itself is engaging, interesting or satisfying (Lee, Cheung & Chen, 2005). Intrinsic motivation comprises three elements; motivation to know, to accomplish and to experience stimulation (Vallerand, Pelletier, Blais, Briere, Senecal & Vallières, 1992). Intrinsic motivation yields exploration, mastery and spontaneous interest (Csikszentmihalyi & Rathunde, 1993; Ryan, 1995). Exploration and spontaneous interest are also found in mastery-oriented learners, which are often willing to engage in learning because they desire to understand learning material and develop new skills (Ames, 1992). Intrinsic motivation used to direct learning behavior is referred to as intrinsic learning motivation (Gillig, 2016). Learning motivation significantly impacts learning outcomes (Wise & DeMars, 2005) and intrinsically motivated learners acquire more positive academic results (Deci, Vallerand, Pelletier & Ryan, 1991).

In sum, it is expected that mastery GOI promotes deep learning in DGBL environments. Furthermore, mastery goals align well with the attitude of intrinsically motivated learners (Ames, 1992). It can therefore be expected that GOI-type impacts learners' intrinsic learning motivation. Subsequently, intrinsic learning motivation positively impacts learning outcomes (Deci, Vallerand, Pelletier & Ryan, 1991; Wise & DeMars, 2005). It can also be expected that the positive relationship between mastery GOI and deep learning in DGBL environments is at least partially explained by the positive relationship between mastery GOI and intrinsic learning motivation and, subsequently, between intrinsic learning motivation and deep learning.

Present study

This study focuses on how GOI influences deep learning in DGBL environments and whether this relationship can be explained by intrinsic learning motivation. The present research aims to contribute to better applicability of digital games in education. The outcomes of this study will be beneficial for educational practitioners when designing instructions for DGBL. The present study aims to answer the following research question; *To what extent does goal-oriented instruction affect students' deep learning of educational content in digital game-based learning environments and is there a mediating function of intrinsic learning motivation between goal-oriented instruction and digital game-based learning outcomes?* Several subquestions have to be answered in order to be able to answer the research question.

Subquestion 1. To what extent does GOI affect deep learning of the educational content in DGBL environments?

Hypothesis 1. It is expected that, contrary to no instruction, GOI increases deep learning of educational content in DGBL environments and that, of the two instruction types, mastery GOI has the largest positive effect on deep learning of educational content in DGBL environments.

Subquestion 2. To what extent does intrinsic learning motivation affect deep learning of educational content in DGBL environments?

Hypothesis 2. intrinsic learning motivation positively influences deep learning of educational content in DGBL environments.

Subquestion 3. To what extent does the type of GOI affect intrinsic learning motivation?

Hypothesis 3. It is expected that, contrary to no instructions, GOI increases intrinsic learning motivation and that, of the two instruction types, mastery GOI has the largest positive effect on intrinsic learning motivation.

Subquestion 4. To what extent can the relationship between GOI type and deep learning be (partially) explained by the mediating effect of intrinsic learning motivation?

Hypothesis 4. It is hypothesized that intrinsic learning motivation (partially) explains the relationship between mastery GOI and deep learning of educational content in DGBL environments.

Method

Research design

This study featured an experimental mixed design comprising one control- and two experimental conditions. A mixed design was chosen because deep learning was best measured with a pre-test and post-test. The control condition (containing 35 participants) received a general introduction to the game without GOI. The first experimental condition (containing 36 participants) received a performance GOI. The second experimental condition (containing 32 participants) received a mastery GOI. Students were randomly assigned to one of the three conditions. Students were allocated to equally large groups. However, not all invited students participated in the experiment, which accounts for the small variations in group sizes.

Figure 1 displays the variables in this study. The dependent variable is deep learning of educational content in DGBL. The independent variable is GOI type and the mediating variable is intrinsic learning motivation. To effectively establish a medium effect, an f^2 greater than .15 must be found (Cohen, 1988). With $\alpha=.05$, a power of .80 and three predictors (two dummy

variables and one mediator), a minimum sample size of ($n=77$) was needed. However, for this study 128 students were approached because there was a high chance that not all students would participate.

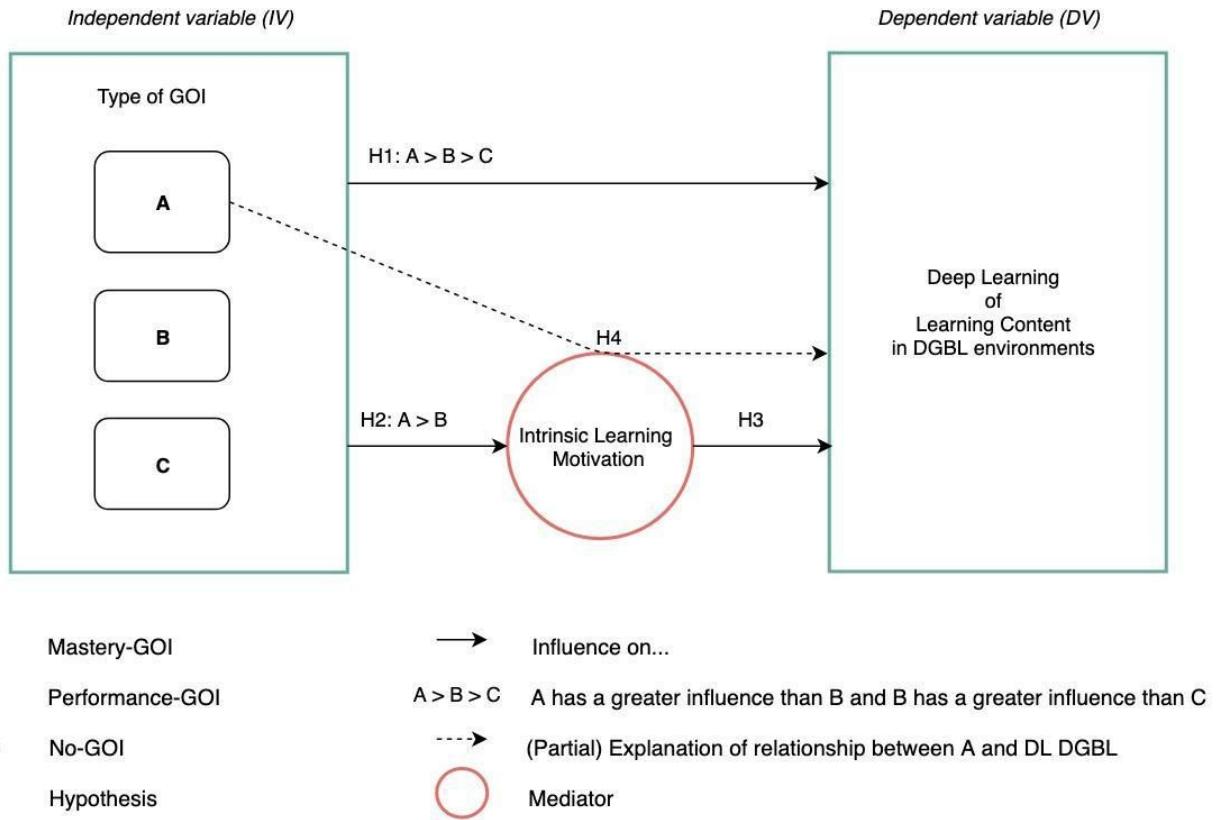


Figure 1. Conceptual research model with hypotheses.

Participants

For this study ($n=103$) Dutch intermediate vocational education students from one institute, (89 women and 14 men) aged 16-25, participated. These students were undergraduates in the 'health and welfare' programs: 'teaching assistant' and 'pedagogical worker'. Given the scarcity of resources, this study used a convenience sample, which would most likely produce a

larger sample thereby would increase statistical power. However, conclusions must be interpreted with care. At the start of the experiment students were asked to give active informed consent (appendix 3). For non-invasive research like this study, parental consent for children aged 16-17 is not required (FRA, 2014).

Instruments

Domain. ‘Safety Heroes’, the DGBL environment that was used, was developed to teach factory, construction, health and transport workers and students, aged 15-40, how to reduce occupational risks. See figure 2 for the domains in the game. The experiment used the health domain because this is the study-domain of the participants.

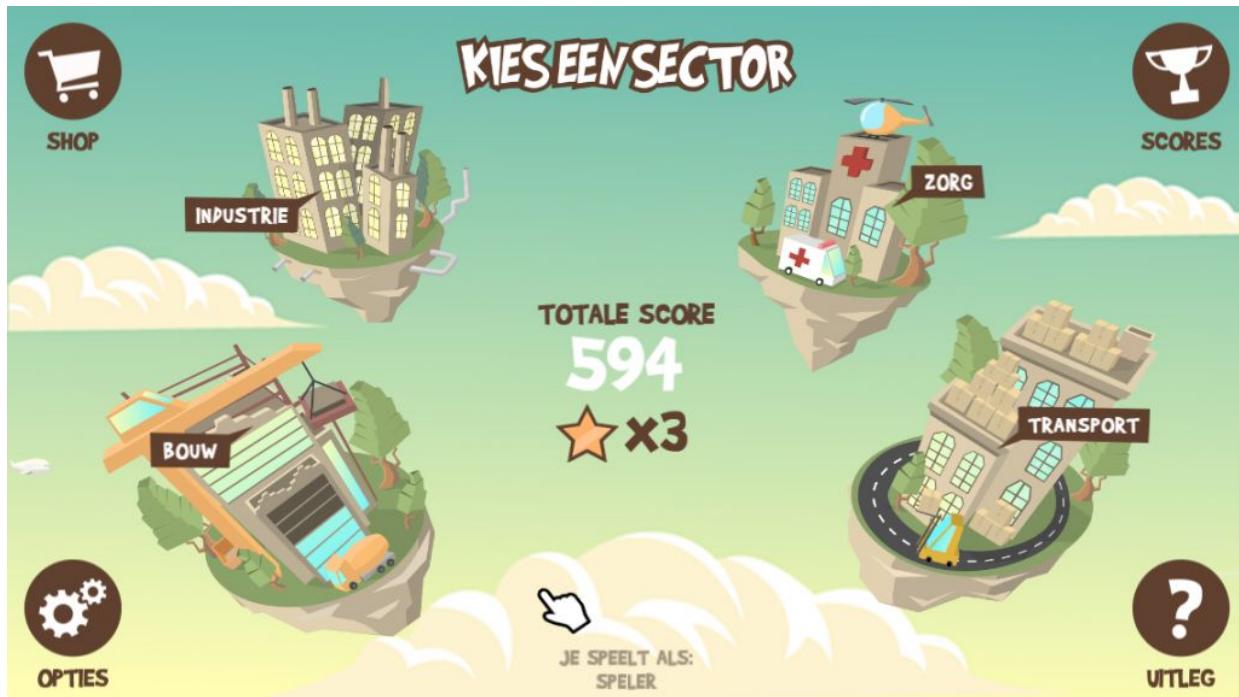


Figure 2. Several domains in the game.

Instruction. The treatment groups received different instructions (appendix 5), according to their ascribed condition. The control condition received no GOI but received practical information (e.g. content of the game). The performance condition was instructed to show their competency by achieving the highest game score. The mastery condition was instructed to gain knowledge and understanding of how to recognize and deal with safety risks.

Motivation questionnaire. Intrinsic learning motivation was measured after instruction but before participants played the game because GOI type was expected to affect intrinsic learning motivation, which affects deep learning during gameplay. Intrinsic learning motivation was conceptualized as the degree to which one finds learning engaging or satisfying and experiences joy in learning. In this case, intrinsic learning motivation refers to students' intrinsic motivation for the coming (DGBL) lesson, such as the experiment which is therefore regarded as a lesson. The Academic Motivation Scale [AMS] (Vallerand et al., 1992) uses three subscales to measure intrinsic learning motivation: knowledge (4 items), accomplishment (4 items) and stimulation (3 items). Utvaer and Haugan's (2016) adaptation of the AMS was used. This questionnaire contains 11 items on a 7-point Likert scale (1= does not correspond at all, 7= corresponds exactly). An example question is "I go to school because I experience pleasure and satisfaction while learning new things". Utvaer and Haugan (2016) tested their AMS among vocational education students (87% women), a population similar to this study. After deleting two items, Utvaer and Haugan (2016) concluded the AMS is reliable and valid ($\chi^2 = 662.98$, $p = .001$, $df = 278$, $\chi^2/df = 2.38$, RMSEA = .059, SRMR = .060, NFI = .96, NNFI = .97, CFI = .98). However, the AMS - as used by Utvaer and Haugan (2016) - targets the motivation to learn in general. In the present study, the intrinsic learning motivation for the coming lesson is targeted.

For example, the earlier mentioned item was adapted to “I attend class because I experience pleasure and satisfaction when I learn new things”. Moreover, students were instructed to answer the questionnaire whilst keeping their motivation for the coming lesson, the experiment, in mind. The present study has therefore adapted the AMS to better fit the research purpose. A pilot study was conducted to investigate the reliability and validity of the adapted AMS. An unrotated principal components analysis was conducted to investigate the internal structure of the adapted AMS. The AMS consisted of one factor with an explained variance of 58,95%. Reliability analysis indicated a reliability of .88, which is a high reliability according to Cotan criteria (Evers, Lucassen, Meijers & Sijtsema, 2010). Three subscales were conceptualized by the authors of the original AMS. Results from the pilot study indicated that two subscales had a high reliability according to Cotan criteria (Evers et al., 2010) (Knowledge .83 and accomplishment .83). The third subscale (stimulation) had a low reliability of .60. Deleting items in this subscale did not increase reliability. Because the subscales are not used individually, the low reliability of the third subscale did not influence the reliability of the questionnaire for the present research.

The questionnaire was translated to Dutch because this is participants' native language (appendix 6). The translation was validated with backwards translation by a professional translator. After correct translation to Dutch, an intermediate vocational education teacher has inspected the translation in order to assess whether intermediate vocational education students would comprehend the questions. The teacher indicated that item one and two were too similar for students to be able to see the difference. These items have therefore been adapted.

Pre-test and Post-test. Deep learning was conceptualized as retention and processing of information to make it usable for problem-solving in unfamiliar settings. Twenty questions about

occupational risks were composed. A pilot study has been conducted in order to determine the distribution of questions over de pre- and post-test. However, due to the scope of this study, the post-test was administered directly after gameplay and it does therefore not account for the retention of new knowledge. Based on the pilot, two questions were excluded from the final experiment because the majority of the students ($>80\%$) answered these questions correctly. Questions that were easy to answer would endanger the responsiveness of the questionnaire, which would make it harder to detect significant differences in deep learning. Furthermore, pairwise assignment (based on correct answer probability) of items was used to create an equally difficult pre- and post-test.

In the final experiment, deep learning was measured with 18 multiple-choice questions which were based on four types of work-related risks that are featured in the game (van den Bos, 2013): psychosocial workload (6 items), physical strain (4 items), exposure to biological agents (5 items) and company emergency services (3 items). The distribution of risk-types is made to be representative of the occupational risks in the domain of healthcare (Inspection of Social Affairs, 2015). The questions presented a scenario for which participants select one of four responses: A-D. At the start of the experiment, 9 Questions had to be answered. The remaining 9 questions were answered after participants played the game. An example question is: "While preparing a fruit snack you cut your finger. At the same time a child falls and gets wounded. What do you do?". The correct response would be: A. "You call your colleague so that he can take care of the child's wound while you take care of your own injury". Appendix 7 displays the test and test-score interpretation. Content validity of the instrument was assessed by a safety worker in

the childcare sector. The safety worker suggested adding a question on dealing with safety issues that are neglected by colleagues, as this frequently occurs in practice.

DGBL environment. ‘Safety Heroes’ is an interactive 2-dimensional platform-game, developed by the ministry of Social Affairs (Safety Heroes, 2015), see figure 3 for the design of the game.



Figure 3. Start screen Safety Heroes.

The player guides several employees safely through levels by signalling safety risks and timely providing the correct intervention. The domain consists of 12 levels. The aim is to guide all employees, safely through the level. Characters gradually lose health when they encounter occupational risks, see figure 4. Players are rewarded for speed and remaining health of employees.

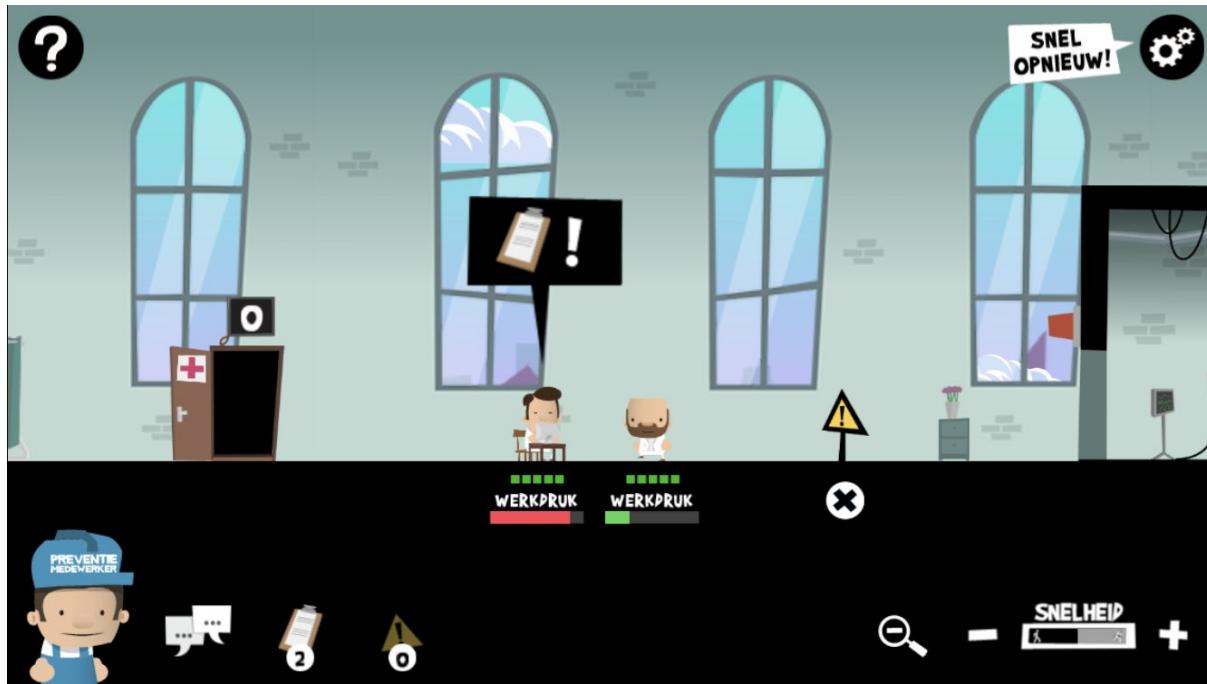


Figure 4. Level 1 Safety Heroes.

Levels can be replayed. Perfectly played levels are rewarded with coins for the ‘health centre’, a place to relax and work on physical and mental wellbeing. Safety Heroes has several game characteristics. 1) it is interactive (Prensky, 2001); players’ actions determine game outcomes. 2) Safety Heroes is based on a set of rules and constraints (Wouters & van Oostendorp, 2013); players can use an intervention for a limited amount of times during a level. 3) The game has a clear goal (Wouters & van Oostendorp, 2013) and 4) players receive constant, immediate feedback (Wouters & van Oostendorp, 2013) through health bars of characters.

Pilot. Prior to the experiment, a risk analysis (appendix 2) and pilot study ($n=15$) were conducted. The participants in the pilot were not included in the final experiment. The pilot was used to assess reliability and validity of instruments, whether the experiment could be conducted in the planned time frame and if participants understood all instructions and questions. The

reliability of the intrinsic learning motivation questionnaire after the pilot was high (.90) according to Cotan criteria (Evers, et al., 2010). All items have therefore been included in the final experiment. A second translator has inspected the AMS because participants in the pilot indicated that item six and item seven were too similar. Therefore, these items were adjusted.

Procedure

One week before the experiment, participants were informed about what was expected of them. Participants were told to bring their own mobile device. One day prior to the experiment, participants were reminded of the experiment via e-mail. The experiment was conducted on a school day at participants' school. Appendix 1 displays a timetable.

After receiving the informed consents, the experimenter relayed practical information. Students received a link to Google Forms in which they could answer all questions. First, students were asked to state their age (interval), sex (categorical), study domain (categorical) and study year (categorical). Students then answered the pre-test within 15 minutes. The participants were then instructed according to their treatment condition. They then answered the AMS within 10 minutes, after which they were instructed to download and play the game for 30 minutes. The experimenter then asked students to state their game scores and to answer the post-test within 15 minutes. Students participated individually and were instructed to refrain from discussing content and structure until the experiment was completed. The 'Google Forms' entries in which the students answered the questionnaire cannot be retraced to individuals. Furthermore, after the entries were downloaded and saved onto a password-protected USB-drive, the entries were deleted from the researchers' 'Google Drive'. Upon completion of the research, the data,

including the informed consent forms, was handed over to the secured data-storage facility of Utrecht University.

Data analysis

This study investigates several hypotheses. The relationship between GOI and deep learning was tested with a one-way between groups ANOVA with a Bonferroni post hoc test. The Bonferroni post hoc test was used because it corrects its' significance level for the number of tests between the groups. It is expected that, contrary to no instructions, GOI increases deep learning of learning content in DGBL environments and that mastery GOI, in contrast to performance GOI, promotes more deep learning of learning content in DGBL environments. A linear regression analysis was used to test the hypothesized relationship between intrinsic learning motivation and deep learning. It was hypothesized that intrinsic learning motivation positively influences deep learning. Another one-way between groups ANOVA was used to test the relationship between GOI and intrinsic learning motivation. Again, a Bonferroni post hoc test was used to infer specific between group differences. The ANOVA tested the hypothesis that, contrary to no instructions, GOI increases intrinsic learning motivation and that mastery GOI type has a more positive effect on intrinsic learning motivation than performance GOI.

This study also hypothesized a mediated relationship. The dependent variable was 'deep learning of educational content in DGBL environments. This is an interval level variable. The independent variable was 'GOI type'. This is a categorical variable, comprising three categories: 1) no GOI, 2) performance GOI and 3) mastery GOI. The mediation variable was intrinsic learning motivation, which was measured at interval level. This study used IBM SPSS and the PROCESS macro (Hayes & Preacher, 2014) to test for the mediated relationship of GOI type on

deep learning by intrinsic learning motivation. PROCESS allows researchers to estimate the relative direct and indirect effects of a multicategorical X via M on Y (Hayes & Preacher, 2014). To give a clear presentation of the research population, the variables sex, age, educational year and type of education are used to describe the population. Significance level of all tests was set at $p=.05$. Cohen's conventions (1988) were used to interpret effect sizes.

Results

In order to investigate how intrinsic learning motivation affects the relationship between GOI type and deep learning, several analyses were conducted. A description of the data inspection, which includes the assessment of assumptions for the different analyses is presented in Appendix 8. All variables satisfy the assumptions, except for the assumption of influential cases. The data inspection indicated that the assumption of influential cases was violated by nine outliers. These outliers could be related to divergent scores on intrinsic learning motivation. The outliers were excluded from analysis. As a result, $n = 94$ cases were included in the final analysis. The following sections will discuss the composition of the research population in regard of several characteristics. Thereafter, each hypothesis are tested and results of these analyses are presented.

Descriptive statistics

The number of students that participated in the experiment was $n = 103$. Because nine outliers were excluded from analysis, $n = 94$ participants were included in the final analysis. Participant's ages ranged from 16 to 25. The majority of the participants was younger than 20 (79,6%) and female (86,4%). Of the participants, slightly more than half (54,4%) were enrolled in the program pedagogical worker. More than half of the participants (60,2%) were in their

second educational year. Table 1 presents the minimum and maximum score, mean and standard deviation for the variables in the analysis.

Table 1

Descriptive Statistics for the Variables Deep Learning and Intrinsic learning motivation

Variable	Minimum	Maximum	Mean	SD
Control group				
Deep learning	-4	3	.26	1.63
Intrinsic learning motivation	41	73	55.55	8.58
Performance GOI				
Deep learning	-4	3	.14	1.8
Intrinsic learning motivation	35	65	50.21	7.84
Mastery GOI				
Deep learning	-4	4	-.38	2.05
Intrinsic learning motivation	32	66	52.12	9.82

Note. Deep learning = the difference score between the pre- and post-test; Intrinsic learning motivation = the score of the AMS questionnaire.

Effect of GOI on Deep Learning

The first hypothesis, predicting the positive influence of GOI on deep learning was tested by means of a one-way between groups ANOVA with deep learning as the dependent variable, and GOI type as the independent variable. The ANOVA was statistically insignificant $F(2, 91) = 1.11, p = .33, \eta^2 = .02$. Which indicates learners do not exhibit more deep learning when they receive a GOI. The Bonferroni post hoc analysis can be omitted because there are no statistically significant differences between the groups. Based on the results of this analysis, hypothesis 1 must be rejected.

Effect of intrinsic learning motivation on Deep Learning

The second hypothesis predicted that intrinsic learning motivation would positively influence deep learning. This was tested with a linear regression analysis. Deep learning was used as dependent variable, intrinsic learning motivation was used as a predictor variable. The analysis indicates that intrinsic learning motivation significantly influences deep learning $F(1, 92) = 4.80, p = .03, R^2 = .04$. The regression coefficients are presented in table 2. Intrinsic learning motivation accounts for 4% of variability in deep learning, which is a small effect according to Cohen's conventions (1988). Based on these results, hypothesis 2 is confirmed.

Table 2

Regression coefficients for deep learning on intrinsic learning motivation

Variable	b	SE	Beta	t	p
<i>Constant</i>	-2.41	1.11		-2.17	.03*
<i>Intrinsic learning motivation</i>	.05	.02	.23	2.19	.03*

Note. * $p < .05$

Effect of GOI on intrinsic learning motivation

The third hypothesis, predicting a positive relationship between GOI and intrinsic motivation, was tested with a one-way between groups ANOVA and a Bonferroni post hoc test. The result of the analysis was insignificant $F(2, 91) = 2,84, p = .06, \eta^2 = .06$, which indicates that GOI type does not affect students' intrinsic learning motivation. The third hypothesis can therefore not be confirmed but has to be rejected.

Mediation analysis

The fourth subquestion was whether the relationship between GOI type and deep learning was mediated by intrinsic learning motivation. It was hypothesized that intrinsic learning motivation would mediate the relationship between GOI type and deep learning. In order to test this hypothesis a PROCESS mediation analysis (Hayes, 2017) was conducted. Following the causal steps approach (Baron & Kenny, 1986), the first step to test mediation is to compute the relationship between the dependent and independent variable; deep learning and GOI type in this case. However, the analysis of the first hypothesis indicated that no such effect exists. The PROCESS mediation analysis confirms the non-significance of the relationship between GOI type and deep learning $F(2,91) = 1.11, p = .33, R^2 = .02$. According to Baron and Kenny (1986) all further steps can therefore be omitted because there can be no mediation of a relationship that does not exist. The fourth hypothesis is therefore rejected. The mediation procedure is discussed in appendix 9.

Discussion

The aim of this study was to answer the question: *To what extent does GOI affect students' deep learning of learning content in DGBL environments and is there a mediating*

function of intrinsic learning motivation between GOI and DGBL outcomes? This question was put forward because teachers still struggle to integrate DGBL environments in their lessons. It would help teachers to know how a combination of instruction and DGBL affects intrinsic learning motivation and the quality of learning. It was expected that students who received a GOI prior to gameplay would report higher levels of deep learning (Erhel & Jamet, 2016) as well as higher levels of intrinsic learning motivation. Furthermore, it was expected that students who received a mastery GOI would score higher on deep learning (Erhel & Jamet, 2016) and report higher levels of intrinsic learning motivation than students who received a performance GOI (Ames, 1992).

Mediation

It was expected that the effect of GOI type on deep learning would be mediated by intrinsic learning motivation. However, results indicate that there is neither a direct or indirect effect of GOI type on deep learning. A significant relationship between intrinsic learning motivation and deep learning is found but the relationship between GOI type and intrinsic motivation needs further investigation as the results appear to suggest that performance GOI may be detrimental to intrinsic learning motivation. Furthermore, GOI type does not significantly influence deep learning. No mediation can therefore take place. The following sections will separately discuss the relationship between GOI type and deep learning, between GOI type and intrinsic learning motivation and between intrinsic learning motivation and deep learning. Together these relationships make up the mediation framework. The findings will be discussed in light of relevant theories.

GOI type and deep learning

This study does not find a direct relationship between GOI type and deep learning. This is in direct contrast to expectations and findings by Erhel and Jamet (2016) who found that mastery GOI resulted in higher levels of deep learning. Most studies do find a positive relationship between a mastery goal-orientation and strategies that are used for deep learning (Couthino & Neuman, 2008). However, several studies indicate that the use of deep learning strategies does not always relate to higher levels of performance but may even lead to lower performance outcomes (Pokay & Blumenfield, 1990; Bandalos, Finney & Geske, 2003). In the present study, deep learning is measured through learning performance. Furthermore, Pintrich and De Groot (1990) ascribed the negative relationship between deep learning strategies and performance to the improper use of deep learning strategies. Also, mastery-oriented learners are driven by interest, which may lead them to neglect less interesting subjects (Senko & Miles, 2008). It could therefore be that students who received a mastery GOI did indeed use more deep learning strategies but did not perform better on the deep learning test. Future research should therefore include the measurement of strategy use and its relationship to deep learning, GOI and intrinsic learning motivation. A methodological explanation may be that deep learning was operationalised as a learning performance directly after gameplay. It is plausible that the test that was used to measure learning performance did not have sufficient ability to detect an increase in performance due to the limited number of questions. Furthermore, deep learning was conceptualised as the long-term retention of new knowledge and the ability to use this information for problem-solving in unfamiliar settings. Although the test that was used to measure deep learning did measure the ability to use new information for problem-solving in unfamiliar settings, it could not measure long-term retention due to practical limitations. A

replication of this study should include a delayed post-test to account for the long-term retention of information.

GOI type and intrinsic learning motivation

Earlier findings, summarized in a meta-analysis by Rawsthorne and Elliot (1999), indicate that mastery goal orientation is positively related to intrinsic learning motivation. Which implies that individuals who pursue mastery goals are more likely to have higher levels of intrinsic motivation. However, the present study does not support this hypothesis. This study specifically tested whether prescribed goal orientations, in the form of GOI, increased intrinsic learning motivation. The analysis indicates this is not the case. The results even indicate that performance GOI negatively impacts instruction, compared to not receiving a GOI. Although the difference in intrinsic learning motivation between the different GOI types does not exceed the critical value, the value may indicate a trend. Post hoc analyses with Bonferroni reveal that the largest difference is between no GOI and performance GOI. The control group (no GOI) has more intrinsic learning motivation, which implies that receivers of a performance GOI might be less motivated. There clearly are no differences between no instruction and mastery and between performance GOI and mastery GOI. The results may thus even indicate that performance GOI negatively impacts instruction but further research is needed to confirm this. One explanation for this finding is the fact that instructions are a form of external control. Instructions are external to the receiver. Intrinsic learning motivation relates to an internal drive to understand and to learn (Deci, 1971; Gillig, 2016). Providing instructions on what goal to pursue may be experienced as external control. Experiencing external control negatively impacts intrinsic motivation (Deci & Ryan, 2000). A second explanation is found in achievement goal theory. Elliot and Harackiewicz

(1996) proposed that both mastery and performance goals can be interpreted differently by individuals. A division is made between approach and avoidance. A performance avoidance goal interpretation would be to avoid failure, whereas a performance approach goal interpretation would be to achieve success. Elliot and Harackiewicz (1996) found that individuals with performance avoidance goals were significantly less motivated than individuals with other achievement goals. Because the present study has not measured how participants have interpreted the goals that were set in the GOI, it is not clear to what extent students have tried to avoid low scores in the game instead of achieving high scores. This may explain why, although instructions are a form of external control, only the performance GOI appears to be less motivated. Further research, which includes participants' interpretation of achievement goals, is needed.

Deep learning and intrinsic learning motivation

This study hypothesized a positive relationship between intrinsic learning motivation and deep learning. Previous research has shown that intrinsic learning motivation is positively related to learning outcomes (Deci et al., 1991; Wise & DeMars, 2005). The present study confirms these conclusions. A positive relationship is found between intrinsic learning motivation and deep learning, which indicates that intrinsically motivated students process new information more deeply and are better able to use information for problem-solving in unfamiliar settings. However, the effect that is found is small. Stegers-Jager, Cohen-Schotanus and Themmen (2012) argue that deep learning only leads to better academic performance when learners actively participate and use proper resource management. They also found that intrinsic motivation only had an indirect effect on performance. The effect of intrinsic motivation was found to be

mediated by participation. Although the present study confirms a positive relationship between intrinsic learning motivation and deep learning, it is necessary to investigate the impact of learning strategies, resource management and participation on the relationship between intrinsic learning motivation and deep learning.

Limitations

Several limitations should be taken into account when interpreting the results. The first limitation is the game that was used for this study. Students experienced the game as difficult and very stressful. Furthermore, a standard lesson takes about 45 minutes, with some exceptions that last 90 minutes. This experiment lasted almost two hours per group. The influence this game and the experiment as a whole may have had on the mental state and cognitive fatigue of students could have influenced how students answered the questions in the post-test. However, the game is an adequate example of available educational games at the present time. It can therefore be expected that playing educational games causes a degree of cognitive fatigue that makes it harder to concentrate after gameplay. Due to the limited availability of time, it was not possible to delay the post-test so that students could recover from their cognitive fatigue.

The second limitation is the reliability of the third subscale of the intrinsic learning motivation questionnaire which had a low internal reliability. The subscales of the AMS can therefore not be used to analyse the degree to which GOI type affects the three dimensions of intrinsic learning motivation nor how these dimensions individually affect deep learning. However, that was not the aim of this study. The reliability of the complete questionnaire was high, which indicates that the complete questionnaire can be used to draw conclusions about intrinsic learning motivation.

A third limitation is that deep learning is conceptualized as the long-term retention and integration of knowledge into the existing knowledge-base. However, because gameplay was immediately followed by answering the post-test questions, retention could not be measured. It may very well be that the timing of the post-test influenced the results. Future research should use a delayed post-test to investigate whether GOI and intrinsic motivation affect the long-term retention of knowledge.

A fourth limitation has to do with the generalisability of the present study. The aim of this study was to contribute to intermediate vocational education teachers' knowledge of how to integrate DGBL environments into the curriculum. Intermediate vocational education students are a very diverse group. However, the research sample that was used in this study was largely made up out of women. Out of the total number of intermediate vocational education students, slightly less than half is female (Centraal Bureau voor de Statistiek, 2019). This must be taken into account when the results of this study are interpreted.

Practical implications

This study has several practical implications. Dutch teachers have been worried by the decline of motivation among students in secondary education and higher for a long time (Van der Veen, De Jong, Van Leeuwen & Korteweg, 2005; Peetsma & Veen, 2008). This study indicates that the combined use of DGBL and GOI may not improve motivation of students. However, it does underline the importance of intrinsic learning motivation for learning. Teachers could thus strive to improve motivation and engagement of their students in order to improve learning outcomes. A second practical implication is that intrinsic learning motivation increases deep learning. As deep learning is a much-preferred form of learning it is important for educationalists

to understand how deep learning can be stimulated among students. This study contributes to teachers' understanding of deep learning by providing evidence for the relationship between deep learning and intrinsic learning motivation.

Future research

Several suggestions for future research can be made. First of all, future research into the relationships between GOI type, intrinsic learning motivation and deep learning in DGBL environments should use a delayed post-test to be able to measure the long-term retention component of deep learning. The present study cannot be conclusive about the effect of GOI on the long-term retention of learning materials. Furthermore, the number of items used to measure deep learning may be increased to ensure that differences can be more easily detected.

The discussion of the research findings in light of relevant literature evidences that the conceptualized relationships between GOI type, intrinsic learning motivation and deep learning are not self-contained. Other factors should be added to the framework. Future research should include the effect of interpretation of GOI, and include participation, resource management and strategy use into the framework.

The present study also has conceptualized intrinsic learning motivation as the intrinsic motivation to learn from a lesson. However, this does not necessarily equate to their intrinsic motivation to learn with digital games. Further research could specify intrinsic learning motivation in DGBL settings as the intrinsic motivation to learn with digital games.

Conclusion

In sum, the present study investigated whether GOI type would influence deep learning of students in a DGBL environment. Furthermore, this study tested whether the hypothesized

relationship between GOI type and deep learning was mediated by intrinsic learning motivation. This study suggests that the framework of GOI, intrinsic motivation and deep learning is more complex than what was accounted for in this study. No relationship between GOI type and deep learning was found, which indicates that providing students with GOI does not affect their deep learning in DGBL environments. However, a relationship has been found between intrinsic learning motivation and deep learning. This study indicates that instructing students to pursue performance or mastery goals, does not improve the quality of their learning in DGBL environments. However, there is an indication that performance goals may have a negative effect on intrinsic learning motivation. This indication needs to be confirmed by future research. In any case, students' intrinsic learning motivation does affect their deep learning. Which underlines the importance of enhancing students' motivation in DGBL environments for their learning performance.

References

- Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology*, 84(3), 261. doi:10.1037/0022-0663.84.3.261
- Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. *Journal of educational psychology*, 80(3), 260. doi:10.1037/0022-0663.80.3.260
- Baek, Y. K. (2008). What hinders teachers in using computer and video games in the classroom? Exploring factors inhibiting the uptake of computer and video games. *CyberPsychology & Behavior*, 11(6), 665-671. doi:10.1089/cpb.2008.0127
- Bandalos, D. L., Finney, S. J., & Geske, J. A. (2003). A model of statistics performance based on achievement goal theory. *Journal of educational psychology*, 95(3), 604-616.
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173-1182. doi:10.1037/0022-3514.51.6.1173
- Bouffard, T., Boisvert, J., Vezeau, C., & Larouche, C. (1995). The impact of goal orientation on self-regulation and performance among college students. *British journal of Educational Psychology*, 65, 317-329. doi:10.1111/j.2044-8279.1995.tb01152.x
- Centraal Bureau voor de Statistiek (2019) Mbo; deelnemers, niveau, leerweg, studierichting, regiokenmerken. Retrieved from
<https://statline.cbs.nl/Statweb/publication/?DM=SLNL&PA=83851NED&D1=0&D2=1-2&D3=0&D4=0&D5=0&D6=0,6-18&D7=l&VW=T>

- Chin, C., & Brown, D. E. (2000). Learning in science: A comparison of deep and surface approaches. *Journal of Research in Science Teaching: The Official Journal of the National Association for Research in Science Teaching*, 37(2), 109-138.
- Cohen J. (1988). Statistical power for the behavioral sciences. Hillsdale, United States: Erlbaum.
doi: 10.1016/C2013-0-10517-X
- Connolly, T. M., Boyle, E. A., MacArthur, E., Hainey, T., & Boyle, J. M. (2012). A systematic literature review of empirical evidence on computer games and serious games. *Computers & Education*, 59, 661-686. doi:10.1016/j.compedu.2012.03.004
- Coutinho, S. A., & Neuman, G. (2008). A model of metacognition, achievement goal orientation, learning style and self-efficacy. *Learning environments research*, 11(2), 131-151.
- Csikszentmihalyi, M., & Rathunde, K. (1993). The measurement of flow in everyday life: Toward a theory of emergent motivation. In J. E. Jacobs (Ed.), Developmental perspectives on motivation: Nebraska symposium on motivation (pp. 57–97). Lincoln, United States: University of Nebraska Press. doi:10.1177/001698629503900108
- Deci, E. L. (1971). Effects of externally mediated rewards on intrinsic motivation. *Journal of Personality and Social Psychology*, 18, 105-115. doi:10.1037/h0030644
- Deci, E. L., Vallerand, R. J., Pelletier, L. G., & Ryan, R. M. (1991). Motivation and education: The self-determination perspective. *Educational Psychologist*, 26, 325-346.
doi:10.1080/00461520.1991.9653137
- Darnon, C., Butera, F., & Harackiewicz, J. M. (2007). Achievement goals in social interactions: Learning with mastery vs. performance goals. *Motivation and Emotion*, 31, 61-70.
doi:10.1007/s11031-006-9049-2

- Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist*, 41, 1040–1048. doi:10.1037/0003-066X.41.10.1040
- Elliot, A. J., McGregor, H. A., & Gable, S. (1999). Achievement goals, study strategies, and exam performance: A mediational analysis. *Journal of educational psychology*, 91(3), 549. doi:10.1037/0022-0663.91.3.549
- Elliot, A. J., & Harackiewicz, J. M. (1996). Approach and avoidance achievement goals and intrinsic motivation: A mediational analysis. *Journal of personality and social psychology*, 70(3), 461-475. doi: 10.1037/0022-3514.70.3.461
- Erhel, S., & Jamet, E. (2016). The effects of goal-oriented instructions in digital game-based learning. *Interactive Learning Environments*, 24, 1744-1757.
doi:10.1080/10494820.2015.1041409
- Evers, A., Lucassen, W., & Meijer, R. R., Sijtsma, K., (2010). The Dutch review process for evaluating the quality of psychological tests: History, procedure, and results. *International Journal of Testing*, 10(4), 295-317.
- FRA [European Union Agency for Fundamental Rights] (2014, 1 january). *Child Participation in Research*. Retrieved from
<https://fra.europa.eu/en/theme/rights-child/child-participation-in-research#101>
- Gillig, B. (2016). *The variance of students' academic motivation during college: Theoretical and empirical implications*. Unpublished doctoral dissertation. Iowa, United States: University of Iowa.

Hayes, A. F., & Preacher, K. J. (2014). Statistical mediation analysis with a multicategorical independent variable. *British Journal of Mathematical and Statistical Psychology*, 67, 451-470. doi:10.1111/bmsp.12028

Hennessey, B., Moran, S., Altringer, B., & Amabile, T. M. (2015). Extrinsic and intrinsic motivation. *Wiley Encyclopedia of Management*, 1-4.
doi:10.1002/9781118785317.weom110098

Heyman, G. D., & Dweck, C. S. (1992). Achievement goals and intrinsic motivation: Their relation and their role in adaptive motivation. *Motivation and emotion*, 16(3), 231-247.

Inspection of Social Affairs. (2015). *Gezond en veilig werken in de sector Zorg en Welzijn*.

Retrieved from

<https://www.inspectieszw.nl/binaries/inspectieszw/documenten/rapporten/2016/06/15/gezond-en-veilig-werken-in-de-sector-zorg-en-welzijn/Sectorrapportage-Zorg-en-Welzijn-2013-2015.pdf>

Kester, L., Kirschner, P., & Corbalan, G. (2007). Designing support to facilitate learning in powerful electronic learning environments. *Computers in Human Behavior*, 23, 1047-1054. doi:10.1016/j.chb.2006.10.001

Kiili, K. (2005). Digital game-based learning: Towards an experiential gaming model. *The Internet and Higher Education*, 8, 13-24. doi:10.1016/j.iheduc.2004.12.001

Künsting, J., Wirth, J., & Paas, F. (2011). The goal specificity effect on strategy use and instructional efficiency during computer-based scientific discovery learning. *Computers & Education*, 56, 668–679. doi:10.1016/j.compedu.2010.10.009

- Lee, M. K., Cheung, C. M., & Chen, Z. (2005). Acceptance of Internet-based learning medium: the role of extrinsic and intrinsic motivation. *Information & Management*, 42, 1095-1104.
doi:10.1016/j.im.2003.10.007
- Linnenbrink-Garcia, L., Tyson, D. F., & Patall, E. A. (2008). When are achievement goal orientations beneficial for academic achievement? A closer look at main effects and moderating factors. *Revue Internationale de Psychologie Sociale*, 21, 19–70.
doi:10.1177/1932202X16685307
- Mayer, R. E., & Johnson, C. I. (2010). Adding instructional features that promote learning in a game-like environment. *Journal of Educational Computing Research*, 42, 241-265.
doi:10.2190/EC.42.3.a
- McCradden, M. T., Magliano, J. P., & Schraw, G. (2010). Exploring how relevance instructions affect personal reading intentions, reading goals and text processing: A mixed methods study. *Contemporary Educational Psychology*, 35, 229-241.
doi:10.1016/j.cedpsych.2009.12.001
- Nicholls, J. G. (1984). Achievement motivation: Conceptions of ability, subjective experience, task choice, and performance. *Psychological Review*, 91, 328–346.
doi:10.1037/0033-295X.91.3.328
- Nolen, S. B. (1988). Reasons for studying: Motivational orientations and study strategies. *Cognition and Instruction*, 5, 269–287. doi:10.1207/s1532690xci0504_2
- Peetsma, T. T. D., & Veen, H. (2008). *Een tweede onderzoek naar de beïnvloeding van motivatie bij vmbo-leerlingen*. SCO-Kohnstamm Instituut.

- Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of educational psychology, 82*(1), 33-40.
- Pivec, M. (2007). Play and learn: potentials of game-based learning. *British Journal of Educational Technology, 38*, 387-393. doi:10.1111/j.1467-8535.2007.00722.x
- Plass, J. L., Homer, B. D., & Kinzer, C. K. (2015). Foundations of game-based learning. *Educational Psychologist, 50*, 258-283. doi:10.1080/00461520.2015.1122533
- Pokay, P., & Blumenfeld, P. C. (1990). Predicting achievement early and late in the semester: The role of motivation and use of learning strategies. *Journal of Educational Psychology, 88*, 144–161.
- Prensky, M. (2001). Fun, play and games: What makes games engaging. *Digital Game-based Learning, 5*, 5-31. doi:10.1145/950566.950596
- Rawsthorne, L. J., & Elliot, A. J. (1999). Achievement goals and intrinsic motivation: A meta-analytic review. *Personality and Social Psychology Review, 3*, 326-344. doi:10.1207/s15327957pspr0304_3
- Ryan, R. M. (1995). Psychological needs and the facilitation of integrative processes. *Journal of Personality, 63*, 397-427. doi:10.1111/j.1467-6494.1995.tb00501.x
- Safety Heroes. (2015). Safety Heroes | Voor bedrijven. Retrieved from <http://www.safetyheroes.nl/voor-bedrijven>
- Schraw, G., Crippen, K. J., & Hartley, K. (2006). Promoting self-regulation in science education: Metacognition as part of a broader perspective on learning. *Research in science education, 36*(1-2), 111-139.

- Senko, C., & Miles, K. M. (2008). Pursuing their own learning agenda: How mastery-oriented students jeopardize their class performance. *Contemporary Educational Psychology*, 33(4), 561-583.
- Stegers-Jager, K. M., Cohen-Schotanus, J., & Themmen, A. P. (2012). Motivation, learning strategies, participation and medical school performance. *Medical education*, 46(7), 678-688. doi: 10.1111/j.1365-2923.2012.04284.x
- Ter Vrugte, J. (2016). Serious support for serious gaming. CTIT Ph.D. thesis series No. 16-387. Enschede, The Netherlands: Gildeprint. doi:10.3990/1.9789036541060
- Utvær, B. K. S., & Haugan, G. (2016). The academic motivation scale: dimensionality, reliability, and construct validity among vocational students. *Nordic Journal of Vocational Education and Training*, 6, 17-45. doi:10.3384/njvet.2242-458X.166217
- Valle, A., Cabanach, R. G., Núñez, J. C., González-Pienda, J., Rodríguez, S., & Piñeiro, I. (2003). Multiple goals, motivation and academic learning. *British Journal of Educational Psychology*, 73(1), 71-87.
- Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallières, E. F. (1992). The Academic Motivation Scale: A measure of intrinsic, extrinsic, and amotivation in education. *Educational and Psychological Measurement*, 52, 1003-1017. doi:10.1177/0013164492052004025
- Van den Bos, J.A. (2013). Gezond & veilig werken. *Sectorrapportage zorg en welzijn 2010-2012*. Inspectie SZW (Ministerie van Sociale Zaken en Werkgelegenheid).

- Van der Veen, I., De Jong, U., Van Leeuwen, M., & Korteweg, J. A. (2005). The development of higher education students' interest in their subject: the case of higher professional education in the Netherlands. *Studies in Higher Education*, 30(3), 275-289.
- Van Eck, R. (2006). Digital game-based learning: It's not just the digital natives who are restless. *EDUCAUSE Review*, 41(2), 16-30.
- Vandergrusse, S., & Elen, J. (2017). Towards a game-based learning instructional design model focusing on integration. In *Instructional Techniques to Facilitate Learning and Motivation of Serious Games* (17-35). Cham, Switzerland: Springer.
doi:10.1007/978-3-319-39298-1_2.
- Vermunt, J. D., & Vermetten, Y. J. (2004). Patterns in student learning: Relationships between learning strategies, conceptions of learning, and learning orientations. *Educational psychology review*, 16(4), 359-384.
- Vollmeyer, R., & Burns, B. D. (2002). Goal specificity and learning with a hypermedia program. *Experimental Psychology*, 49, 98–108. doi:10.1027//1618-3169.49.2.98
- Wise, S. L., & DeMars, C. E. (2005). Low examinee effort in low-stakes assessment: Problems and potential solutions. *Educational Assessment*, 10, 1-17.
doi:10.1207/s15326977ea1001_1
- Wouters, P., Van Nimwegen, C., Van Oostendorp, H., & Van Der Spek, E. D. (2013). A meta-analysis of the cognitive and motivational effects of serious games. *Journal of Educational Psychology*, 105, 249-265. doi:10.1037/a0031311

Wouters, P., & Van Oostendorp, H. (2013). A meta-analytic review of the role of instructional support in game-based learning. *Computers & Education*, 60, 412-425.
doi:10.1016/j.compedu.2012.07.018

Wouters, P., & van Oostendorp, H. (2017). Overview of instructional techniques to facilitate learning and motivation of serious games. In *Instructional Techniques to Facilitate Learning and Motivation of Serious Games* (pp. 1-16). Springer, Cham.

Young, M. F., Slota, S., Cutter, A. B., Jalette, G., Mullin, G., Lai, B., Simeoni, Z., Tran, M. & Yukhymenko, M. (2012). Our princess is in another castle: A review of trends in serious gaming for education. *Review of Educational Research*, 82, 61-89.
doi:10.3102/0034654312436980

Appendices

- | | |
|------------|--|
| Appendix 1 | Timetable Experiment |
| Appendix 2 | Risk Analysis |
| Appendix 3 | Informed Consent |
| Appendix 4 | FETC-form |
| Appendix 5 | Instruction Transcripts |
| Appendix 6 | Motivation Questionnaire (Original, Pilot and final version) |
| Appendix 7 | Pre-test and Post-test |
| Appendix 8 | Data inspection |
| Appendix 9 | Mediation procedure |

Appendix 1

Table 3

Timetable experimental between-subjects research design

Condition	Experiment structure	Time in minutes
	Preparing room for experiment	30
1. Control-group	1. Signing informed consent 2. General instruction 3. Pre-test 4. Game instruction 5. Motivation measure Downloaden game 6. Playing the game 7. Questionnaire	5 10 15 10 10 5 30 15
	Pause and preparing for next group	15
2. Performance goal-oriented instruction	1. Signing informed consent 2. General instruction 3. Pre-test 4. Performance goal-oriented instruction 5. Motivation measure Downloaden game 6. Playing the game 7. Questionnaire	5 10 15 10 10 5 30 15
	Pause and preparing for next group	15
3. Mastery goal-oriented instruction	1. Signing informed consent 2. General instruction 3. Pre-test 4. Mastery goal-oriented instruction 5. Motivation measure Downloaden game 6. Playing the game 7. Questionnaire	5 10 15 10 10 5 30 15
Total duration of experiment		approximately 6 hours

Appendix 2

Table 4

The risks that can be encountered in this research, the chance these risks can take place, the impact they have and the possible solution to deal with these risks.

Risk	Chance	Impact	Solution
System-wide technical failure during the experiment (e.g. no internet connection in the school).	L	H	Agreement with school for an additional date to do the experiment.
Individual technical failure during the experiment (e.g. low battery for mobile devices)	M	M	Bringing extra chargers for mobile devices.
Teachers might feel resistance toward experiment because of disruption of lessons. The experiment does not directly benefit them.	L	M	To prevent resistance among teachers, they will be invited to a meeting in which the research plan is explained and discussed. Teachers are invited to make suggestions on when the experiment can best take place.
Vocational students are sensitive about failure, to make a test may induce feelings of stress or shame. This might cause students to give false answers in the hope to hide their performance.	M	H	It will be explained that the data will be gathered anonymously, meaning that no one is able to discover which answer belongs to what student.

Because the Academic Motivation Scale is written in English, and some of the students have difficulties with understanding English, the questionnaire has to be translated to Dutch. Translation could be done incorrectly so that the Dutch questions do not resemble the original question.	H	H	To prevent bad translation, both versions of the questionnaire will be presented to an official translator. The translator will judge the accuracy of the translation and suggest improvements. Furthermore, a pilot study will be conducted in order to see where improvements can be made in the procedure. The pilot study also serves to assess the reliability and validity of the instruments. Based on the outcomes of the pilot study, adjustments will be made.
Student participation low.	M	H	Because the experiment will be conducted in cooperation with the school and during a normal school day. Participants might find participating more fun than staying in class. Additional action is the recruitment of additional students from other classes. Agreements must be made with the team-manager about

this.

Loss of data due to defect of laptop	L	H	Having a backup of the data stored on an external hard-drive as well as the syntax.
--------------------------------------	---	---	---

Note. L = Low, M = Moderate, H = High

Appendix 3

Informed consent

Heidelberglaan 1, 3584 CS Utrecht

Datum

3-04-2019



Universiteit Utrecht

Onderwerp

Informatie masteronderzoek en informed consent

Beste student,

In deze brief word je geïnformeerd over het onderzoek naar game-based learning.

Voor wie?

Mijn naam is Coco Lahaye. Ik studeer Onderwijswetenschappen aan de Universiteit van Utrecht.

Wat is het doel van het onderzoek?

Het doel van het onderzoek is inzicht verkrijgen in de effectiviteit van leren met digitale games.

Wat houdt dit onderzoek in?

Het onderzoek heeft een duur van ongeveer 2 uur waarin voorkennis wordt getest, een instructie wordt gegeven, een motivatie vragenlijst wordt ingevuld, een game wordt gespeeld en een vragenlijst wordt ingevuld. Deelname aan dit onderzoek vindt plaats na het ondertekenen van een toestemmingsverklaring.

Privacy en vertrouwelijkheid

Alle gegevens worden vertrouwelijk behandeld en anoniem verwerkt. De gegevens worden alleen voor onderzoeksdoeleinden gebruikt en niet verstrekken aan derden. Dit onderzoek staat los van jouw studie. De resultaten hebben dan ook geen invloed op jouw studie!

Mogelijkheid tot vragen, informatie en toestemming

Als je nog vragen hebt over het onderzoek, stel die dan aan de onderwijskundige of stuur een mail naar: c.t.lahaye@students.uu.nl t.n.v. Coco Lahaye. Je kunt eventueel ook terecht bij supervisor Pieter Wouters via p.j.m.wouters@uu.nl.

Met vriendelijke groet,

Coco Lahaye
c.t.lahaye@students.uu.nl

TOESTEMMINGSVERKLARING

voor deelname aan het onderzoek

Ik heb uitleg gekregen over het onderzoek. Ik heb de informatiebrief gelezen en kon aanvullende vragen stellen aan de onderwijskundige (Coco Lahaye, c.t.lahaye@students.uu.nl) wanneer ik iets niet begreep. Mijn vragen zijn voldoende beantwoord en ik heb voldoende tijd gehad om te beslissen of ik meedoet aan dit onderzoek.

Ik weet dat deelname geheel vrijwillig is en dat alle gegevens anoniem verwerkt zullen worden.

Ik weet dat ik op ieder moment kan beslissen om toch niet mee te doen, daarvoor hoeft ik geen reden te geven.

Ik geef hierbij toestemming om de antwoorden die ik geef op alle gestelde vragen te gebruiken, op te slaan en te verwerken.

Naam participant:

Handtekening:

Datum : ___ / ___ / ___

Appendix 4

APPLICATION FORM FOR THE ASSESSMENT OF A RESEARCH PROTOCOL BY THE FACULTY ETHICS REVIEW BOARD (FERB) OF THE FACULTY OF SOCIAL AND BEHAVIOURAL SCIENCES

General guidelines for the use of this form

1. This form can be used for a single research project or a series of related studies (hereinafter referred to as: "research programme"). Researchers are encouraged to apply for the assessment of a research programme if their proposal covers multiple studies with related content, identical procedures (methods and instruments) and contains informed consent forms and participant information, with a similar population. For studies by students, the FERB recommends submitting, in advance, a research programme under which protocol multiple student projects can be conducted so that their execution will not be delayed by the review procedure. The application of such a research programme must include a proper description by the researcher(s) of the programme as a whole in terms of the maximum burden on the participants (e.g. maximum duration, strain/efforts, types of stimuli, strength and frequency, etc.). If it is impossible to describe all the studies within the research programme, it should, in any case, include a description of the most invasive study known so far.
2. Solely the first responsible senior researcher(s) (from post-doctoral level onwards) may submit a protocol.
3. Any approval by the FERB is valid for 5 years or until the information to be provided in the application form below is modified to such an extent that the study becomes more invasive. For a research programme, the term of validity is 2 years and any extension is subject to approval. The researcher(s) and staff below commit themselves to treating the participants in accordance with the principles of the Declaration of Helsinki and the Dutch Code of Conduct for Scientific Practices as determined by the VSNU Association of Universities in the Netherlands (which can both be downloaded from the FERB site on the Intranet¹) and guarantee that the participants (whether decisionally competent or incompetent and/or in a dependent relationship vis-a-vis the researcher or not) may at all times terminate their participation without any further consequences.
4. The researcher(s) commit themselves to maximising the quality of the study, the statistical analysis and the reports, and to respect the specific regulations and legislation pertaining to the specific methods.
5. The procedure will run more smoothly if the FERB receives all the relevant documents, such as questionnaires and other measurement instruments as well as literature and other sources on studies using similar methods which were found to be ethically acceptable and that testify to the fact that this procedure has no harmful consequences. Examples of studies where the latter will always be an issue are studies into bullying behaviour, sexuality, and parent-child relationships. The FERB asks the researcher(s) to be as specific as possible when they answer the relevant questions while limiting their answers to 500 words maximum per question. It is helpful to the FERB if the answers are brief and to the point.
6. **Our FAQ document that can be accessed through the Intranet provides background information with regards to any questions.**
7. The researcher(s) declare to have described the study truthfully and with a particular focus on its ethical aspects.

¹ See: <https://intranet.uu.nl/facultaire-ethische-toetsingscommissie-fetc>

Signed for approval²:

Date: January 24, 2019

A. **GENERAL INFORMATION/PERSONAL DETAILS**

1.

- a. Name(s), position(s) and department(s) of the responsible researcher(s): Pieter J.M. Wouters, lecturer in the program Educational sciences, faculty of social sciences.
- b. Name(s), position(s) and department(s) of the executive researcher(s): Coco Lahaye, master student in the program Educational sciences, faculty of social sciences.

2. Title of the study or research programme - Does it concern a single study or a research programme? Does it concern a study for the final thesis in a bachelor's or master's degree course?:

Concerns a study for the final thesis of a Master's degree. The title of the thesis is: Digital Game-based learning: How Goal-oriented Instruction and intrinsic learning motivation Affect Deep Learning.

3. Type of study (with a brief rationale):

This study will be a quantitative study. The research is concerned with the relationship between variables. Furthermore, it will be an explanatory research because the study tries to explain the relationship between goal-oriented instruction and deep learning through the relationship of both variables to intrinsic learning motivation.

4. Grant provider: [None](#)

5. Intended start and end date for the study: [February 1, 2019 until July 1, 2019](#)

6. Research area/discipline: [Educational sciences](#)

7. For some (larger) projects it is advisable to appoint an independent contact or expert whom participants can contact in case of questions and/or complaints. Has an independent expert been appointed for this study?³ : [No](#).

8. Does the study concern a multi-centre project, e.g. in collaboration with other universities, a GGZ mental health care institution, a university medical centre? Where exactly will the study be conducted? By which institute(s) are the executive researcher(s) employed?:

² The senior researcher (holding at least a doctoral degree) should sign here.

³ This contact may, in principle, also be a researcher (within the same department, or not) who is able to respond to the question or complaint in detail. Independent is to say: not involved in the study themselves. The FERB upholds that an independent contact is not obligatory, but will be necessary when the study is more invasive.

The study will be conducted at MBO Rijnland (an intermediate vocational education institute) in Woerden. The researcher is a student at Utrecht University.

9. Is the study related to a prior research project that has been assessed by a recognised Medical Ethics Review Board (MERB) or FERB? If so, which? Please state the file number:

No.

B. SUMMARY OF THE BACKGROUND AND METHODS

Background

1. What is the study's theoretical and practical relevance? (500 words max.):

This study investigates the relationship between goal-oriented instruction (either mastery or performance orientation) and deep learning of learning content in digital game-based learning environments [DGBLE]. Scientifically, this is relevant because the integration of DGBLE into more traditional learning environments has not yet received full scholarly attention. However, this attention is needed to be able to ascertain that DGBL is an effective didactical method. Lately researchers have favoured a value-added approach to studying game-based learning, meaning that they have preferred to investigate how adding specific features (such as adding worked examples) increases learning outcomes. However, researchers have mainly focused on features of the game environment itself rather than features of the context in which the game is being presented to students. With this study the researcher hopes to increase the attention to the context in which DGBLE are presented to learners and how this context influences the intrinsic learning motivation of learners. The study aims to contribute to practice by investigating how DGBLE should be integrated into traditional learning environments through the use of instruction and how the type of instruction influences the learners intrinsic learning motivation. Furthermore, the study aims to help educational designers increase the effectiveness of DGBL in practice. DGBLE is seen as a highly potential learning method, however, its capacity has not yet been fully utilized. In an age of rapid digitalization, it is likely that digital environments will become steadily more integral to learning. However, the integration of digital learning environments should not come at the cost of effective learning. This study is aimed at increasing the effectiveness of game-based learning.

2. What is the study's objective/central question?:

To what extent does goal-oriented instruction affect students' deep learning of learning content in DGBL environments and is there a mediating function of intrinsic learning motivation between goal-oriented instruction and DGBL outcomes?

3. What are the hypothesis/hypotheses and expectation(s)?:

1. It is expected that, in contrast to no instructions, goal-oriented instructions increase deep learning of learning content in DGBL environments.
2. It is hypothesized that mastery goal-oriented instruction, in contrast to performance goal-oriented instruction, promotes more deep learning of learning content in DGBL environments.

3. Mastery goal-oriented instruction type has a more positive effect on intrinsic learning motivation than performance goal-oriented instruction.
4. Intrinsic learning motivation positively influences deep learning of learning content in DGBL environments.
5. It is hypothesized that intrinsic learning motivation (partially) explains the relationship between mastery goal-oriented instruction and deep learning of learning content in DGBL environments.

Design/procedure/invasiveness

4. What is the study's design and procedure? (500 words max.):

This study will feature an experimental mixed design. The study will use one control condition and two experimental conditions. The conditions vary in the type of instructions participants receive prior to playing the game. A pre-test and post-test will be used to assess the increase in participants knowledge. Intrinsic learning motivation will be measured between instruction and game-play because it is expected that instruction affects intrinsic learning motivation which, in turn, influences deep learning during game-play.

Participants will be recruited one week prior to the experiment. The researcher will shortly present the context and aim of the study to the potential participants. It will be explained what is expected of the participants and the students will be given the opportunity to ask questions. It will also be explained how they can sign up for participation. Participants will be randomly assigned to a condition. One day prior to the experiment, participants will receive a reminder via e-mail. During the experiment, participants are first asked to actively fill in an informed consent form. After signing the informed consent form, students are asked to answer 9 multiple-choice knowledge questions on occupational health and safety risks. They will then receive an instruction, according to their condition. After the instruction, participants will be asked to answer 11 questions about intrinsic learning motivation. Upon completion of the motivation questionnaire, the participants are asked to play the game 'safety heroes' for 30 minutes. After these 30 minutes, they will be asked to answer 9 multiple-choice knowledge questions about occupational health and safety risks. When the participants have answered these questions, the experiment is finished.

5.

- a. Which measurement instruments, stimuli and/or manipulations will be used?⁴:
 - Three types of instruction different for every condition.
 - 1) mastery goal-oriented instruction,
 - 2) performance goal-oriented instruction
 - 3) Instruction with only practical information.

⁴ Examples: invasive questionnaires; interviews; physical/psychological examination, inducing stress, pressure to overstep important standards and values; inducing false memories; exposure to aversive materials like an unpleasant film, video clip, photos or electrical stimulus; long-term of very frequent questioning; ambulatory measurements, participation in an intervention, evoking unpleasant psychological or physical symptoms in an experiment, denial, diet, blood sampling, fMRI, TMS, ECG, administering stimuli, showing pictures, etc. In case of the use of a device (apparatus) or administration of a substance, please enclose the CE marking brochure for the relevant apparatus or substance, if possible.

- Adapted version of the Academic motivation Scale by Vallerand, Pelletier, Blais, Briere, Senecal and Vallières (1992).
- Pre-test with 9 multiple-choice knowledge questions to measure the prior knowledge about safety regulation and occupational risks.
- The serious game called Safety Heroes, developed by the ministry of social affairs (2015).
- Post-test with 9 multiple-choice knowledge questions to measure the gained knowledge about safety regulation and occupational risks after playing the game.

- b. What does the study's burden on the participants comprise in terms of time, frequency and strain/efforts?:

Participants will participate for a maximum of 2 hours on one single day. The efforts of participants will be similar to a normal lesson from their study program. The subject of occupational health and safety risks is also covered in the study program of participants. They do not have to learn new information to participate.

- c. Will the participants be subjected to interventions or a certain manner of conduct that cannot be considered as part of a normal lifestyle?:

No, the study is designed to resemble a learning context that is similar to participants' regular learning context. The difference is the use of a digital game in the learning context.

- d. Will unobtrusive methods be used (e.g. data collection of uninformed subjects by means of observations or video recordings)?: No, data will be collected via questionnaires for which participants have given active informed consent.

- e. Will the study involve any deception? If so, will there be an adequate debriefing and will the deception hold any potential risks?: No

6. Will the participants be tested beforehand as to their health condition or according to certain disorders? Are there any inclusion and/or exclusion criteria or specific conditions to be met in order for a participant to take part in this study?:

Participants are in the age range of 16 to 25 years old and have to be students of intermediate vocational education in the study domain health and welfare.

7. Risks for the participants -

- a. Which risks does the study hold for its participants?:

Participants may feel insecure about their knowledge of occupational health and safety risks. The target population is relatively sensitive to feelings of failure. However, the questionnaires do not lead to a score that can be interpreted as failing or passing. Furthermore, it cannot be guaranteed that participants do not download the wrong application onto their mobile devices. It cannot be guaranteed that the participants do not download malware. However, the participants will receive clear instructions on how to download the application onto their mobile devices. The risk of downloading corrupt software is therefore minimal.

- b. To what extent are the risks and objections limited? Are the risks run by the participants similar to those in daily life?:

The risks are minimal. Both risks are very similar to situations that participants encounter in their daily life. As the participants are students, they will be regularly subjected to tests and assessments.

The risk of downloading corrupt software onto participants' mobile devices is minimal as the application is presented through regular monitored channels (App store and Play store). Furthermore, workers of the Dutch ministry of labour and social affairs designed the software specifically to educate students and employees. If participants were to download an application, or specifically

8. How does the burden on the participants compare to the study's potential scientific contribution (theory formation, practical usability)?:

As mentioned before, the burden on participants is minimal. It requires a maximum of 2 hours of their time. The study may contribute to more effective teaching, which might benefit not only the participants of this study but students in general.

9. Will a method be used that may, by coincidence, lead to a finding of which the participant should be informed?⁵ If so, what actions will be taken in the case of a coincidental finding?:

No.

Analysis/power

10. How will the researchers analyse the data? Which statistical analyses will be used?:

This study uses mediation analyses which will be conducted by using IBM SPSS with the PROCESS macro (Hayes & Preacher, 2014). There are three variables included in the study. The dependent variable is 'deep learning of learning content in DGBL environments'. This will be an interval level variable. The independent variable is 'type of goal-oriented instruction'. This is a categorical variable, comprising three categories: 1) no goal-oriented instruction, 2) performance goal-oriented instruction and 3) mastery goal-oriented instruction. The mediation variable will be intrinsic learning motivation, which will be measured at interval level. PROCESS allows researchers to estimate the relative direct and indirect effects of a mult categorial X via M on Y. Depending on the indicator coding of the independent variable, the PROCESS mediation analysis compares the influence of no goal-oriented instruction to having either performance or mastery goal-oriented instruction. It does not clearly estimate the difference between the effect of performance and mastery oriented instruction. To measure this difference, the analysis will be run again with an alternative indicator coding (Hayes & Preacher, 2014). Furthermore, a linear regression analysis will be used to investigate the relationship between intrinsic learning motivation and deep learning. Two one-way between groups ANOVAs will be used to investigate the relationship between GOI type and intrinsic learning motivation and between GOI type and deep learning. Bonferroni post hoc tests will be used to specify differences between groups.

⁵ For instance: dementia, dyslexia, giftedness, depression, extremely low heartbeat in an ECG, etc. If coincidental findings may be found, this should be included in the informed consent, including a description of the actions that will be taken in such an event.

11. What is the number of participants? Provide a power analysis and/or motivation for the number of participants. The current convention is a power of 0.80. If the study deviates from this power, the FERB would like you to justify why this is necessary: To effectively establish a medium effect, an f^2 greater than .15 must be found (Cohen, 1988). With $\alpha=.05$, a power of .80 and three predictors (two dummy variables and one mediator), a sample size of at least ($n=$)77 is needed. However, for the present study approximately $n=128$ participants will be addressed.

C. PARTICIPANTS, RECRUITMENT AND INFORMED CONSENT PROCEDURE

1. The nature of the research population (please tick):

1. General population without complaints/symptoms

2. General population with complaints/symptoms

3. Patients or population with a diagnosis (please state the diagnosis)

2. Age category of the participants (please tick):

- 18 years or older
- 16-17 years
- 13-15 years
- 12 years or younger

3. Does the study require a specific target group? If so, justify why the study cannot be conducted without the participation of this group (e.g. minors): The target group for this experiment will be intermediate vocational education students in the age range of 16 to 25 years old. Most of these students finance their study program on their own, without parental involvement. Because of these circumstances participants can give their permission for participation without parental interferences. For non-invasive research like this study, parental consent for children aged 16-17 is not required (FRA, 2014).

4. Recruitment of participants -

- a. How will the participants be recruited?: Via a former employer of the researcher.
- b. How much time will the prospective participants have to decide as to whether they will indeed participate in the study?: one week.

5. Does the study involve informed consent or mutual consent? Clarify the design of the consent procedure (who gives permission, when and how). Does the study involve active consent or passive consent? If no informed consent will be sought, please clarify the reason:

The study involves active informed consent, which will be given prior to the experiment, after the researcher has explained what will be expected of the participants.

6. Are the participants fully free to participate and terminate their participation whenever they want and without stating their grounds for doing so?:

The participants will be informed that they are free to participate and terminate their participation at any given moment during the experiment without stating why they do so.

7. Will the participants be in a dependent relationship with the researcher?:

No, the researcher and participants will be in a independent relationship.

8. Compensation

- a. Will the participants be compensated for their efforts? If so, what is included in this recompense (financial reimbursement, travelling expenses, otherwise). What is the amount? No.
- b. Will this compensation depend on certain conditions, such as the completion of the study? No.

D. PRIVACY AND INFORMATION

1.

- a. Will the study adhere to the requirements for anonymity and privacy, as referred to in the Faculty Protocol for Data Storage⁶?:
 - anonymous processing and confidential storage of data (i.e. storage of raw data separate from identifiable data): yes
 - the participants' rights to inspect their own data: yes, this right is explained to participants. They can e-mail the researcher when they want to inspect their data.
 - access to the data for all the researchers involved in the project: yes

If not, please clarify.

- b. Has a Data Management Plan been designed?

Yes. Paper & pencil data will be digitalized. All raw data files (including questionnaires, material and software used at data collection) will be stored and anonymized on YODA on the university server. In the short term data will be stored on the hard drive of the researcher.

2.

- a. Will the participant be offered the opportunity to receive the results (whether or not at the group level)?: At a group level the participants will be offered to receive the results.
- b. Will the results of the study be fed back to persons other than the participants (e.g. teachers, parents)?: Teachers will also be debriefed on the group results.

If so, will this feedback be provided at the group or at the individual level?

Group level.

3.

- a. Will the data be stored on the faculty's data server?: yes, the data will be stored on YODA. This is a special server where only the researcher and supervisor/lecturer have access to.

⁶ This can be found on the Intranet:

<https://intranet.uu.nl/wetenschappelijke-integriteit-facultair-protocol-dataopslag>

- b. Will the data that can be traced back to the individual be stored separately on the other faculty server available for this specific purpose?: no.

If not, please clarify where will the data be stored instead?:

The questionnaires will be answered anonymously. Participants will receive a random number that is not known to the researcher. The data will therefore not include information that can be traced back to individual participants by anyone but the participants.

E. ADDITIONAL INFORMATION

Optional.

F. FORMS TO BE ENCLOSED (CHECKLIST)

- Text (advert) for the recruitment of participants
- Information letter for participant
- Informed consent form for participants
- Written or oral feedback information (debriefing text)
- (Descriptions of) questionnaires
- (Descriptions of) measurement instruments/stimuli/manipulations
- Literature/references

Signature(s):⁷

Date and place: January 24, 2019. Woerden.

Name, position:

Coco Lahaye, Master student Educational Sciences.

⁷ The senior researcher (holding at least a doctoral degree) should sign here.

Appendix 5

1. No goal-oriented instruction

Dia 1: welkom

Welkom studenten en bedankt voor jullie deelname aan mijn afstudeeronderzoek. Ik doe onderzoek naar het gebruik van digitale games in het onderwijs en jullie deelname gaat mij en de wetenschap hopelijk helpen om meer zicht te krijgen in de effectiviteit hiervan. Ik ga jullie een kleine uitleg geven over wat er van jullie verwacht wordt tijdens dit experiment.

Dia 2: inhoud

Het experiment zal een kleine 2 uur duren (maar misschien zijn jullie wel veel sneller klaar). Op het bord kunnen jullie de planning zien, deze blijft het gehele experiment zichtbaar dus als je het even niet meer weet kun je daarop kijken. Zoals jullie kunnen zien bestaat het experiment uit 5 onderdelen.

- Het eerste onderdeel bestaat uit 9 meerkeuzevragen over veilig werken op stage.
- Daarna luisteren jullie naar een instructie.
- In onderdeel 3 gaan jullie een vragenlijst invullen waarin ik jullie vraag naar jullie motivatie om naar de les te komen,
- In onderdeel 4 mogen jullie een game spelen over veiligheid op de werkplek,
- En in het laatste onderdeel volgen er weer 9 meerkeuzevragen die betrekking hebben op de game.

Dia 3: spullen check

Voor we kunnen beginnen vraag ik nog eenmaal of iedere student een pen, een laptop, een telefoon en eventueel oortjes/koptelefoon heeft meegenomen.

Dia 4: planning

Jullie krijgen per activiteit een aantal minuten de tijd om de activiteit te voltooien, op het bord is een planning geprojecteerd zodat jullie kunnen meekijken. Er zal steeds een aantal minuten voordat de tijd verstreken is door ons aangegeven worden hoeveel tijd je nog hebt om de activiteit af te ronden. Als je nu eerder klaar bent is dat geen probleem, wacht dan alsjeblieft even geduldig [ga even op je telefoon zitten, wel zonder geluid!] totdat wordt aangegeven dat we doorgaan naar de volgende activiteit. Als je tussendoor dringende vragen hebt stiek dan even je vinger op dan komt er iemand naar je toe. Als je echter een inhoudelijke vraag hebt tijdens de vragenlijsten zul je daar geen antwoord op krijgen. Je moet altijd een antwoord invullen anders kun je niet verder.

Dia 5: informed consent

Welk antwoord je ook invult dit heeft geen invloed op jouw schoolresultaten. Jullie beantwoorden de vragen anoniem, dat betekent dat wij niet weten wie welk antwoord heeft opgegeven. Ik heb jullie toestemming nodig om de antwoorden te mogen gebruiken. Op jullie tafel vinden jullie een formulier. Zou je dit alsjeblieft willen ondertekenen met je naam, handtekening en de datum van vandaag.

Dia 6: 10 meerkeuzevragen

We gaan beginnen aan de eerste activiteit, start hiervoor je laptop op. [wachten tot alle laptops zijn opgestart] Het beantwoorden van 9 meerkeuzevragen over veilig werken op stage. Neem de link uit de powerpoint over en start met de beantwoording van de vragen. Als je klaar bent klik je op volgende en wacht je op verder instructie. Ga de vragen die dan verschijnen nog niet lezen en beantwoorden en sluit Google formulieren niet af!

Dia 7: praktische instructie

Jullie gaan straks een game spelen die is ontwikkeld door het ministerie van sociale zaken en werkgelegenheid. De game bestaat uit 12 levels die jullie, als jullie willen steeds opnieuw kunnen spelen. Per level kun je 3 gouden sterren en punten krijgen door ‘je medewerkers’ naar de uitgang te begeleiden [laat voorbeeld zien op het bord].

Dia 8: intrinsieke motivatie

Dan gaan we nu beginnen met de tweede vragenlijst waarvoor jullie je laptop weer mogen pakken en naar Google Formulieren mogen gaan. Jullie hebben nu 10 minuten de tijd om deze vragenlijst over jullie motivatie in te vullen. Dit gaat over jouw motivatie om naar de les te komen. Klik op volgende maar sluit het venster niet! Wacht dan weer tot verdere instructie.

Dia 9: de game

Nu jullie allemaal deze vragenlijst hebben ingevuld gaan we door naar het vierde onderdeel. Pak je telefoon en download het spel safety heroes [verwijs naar logo op bord]. Als je het niet op je telefoon kunt of wilt downloaden dan kun je er ook voor kiezen om het spel online op je laptop te spelen, weet wel dat het spel online iets trager werkt. [Wachten tot het spel door iedereen is gedownload]. Je hebt geen account nodig, klik op direct spelen.

Jullie krijgen 4 sectoren te zien als jullie straks het spel gaan spelen: industrie, bouw, zorg en transport. Let er op dat jullie tijdens deze activiteit alleen in de sector ZORG spelen. Jullie hebben nu 30 minuten de tijd om het spel safety heroes te spelen. Succes met het behalen van de hoogste score.

Dia 10: 9 praktijkvragen

[30 minuten zijn verstreken]

Ik wil dat jullie nu allemaal je mobiel in je zak stoppen en je laptop weer open slaan. Ga weer naar Google Formulieren. In het laatste onderdeel beantwoorden jullie weer 9 meerkeuzevragen over veilig werken op stage. Je hebt hier weer 15 minuten de tijd voor.

Als jullie deze vragen hebben ingevuld zorg er dan voor dat je op het knopje ‘verzenden’ klikt. Je steekt je daarna je gelijk je vinger op zodat wij kunnen checken of we je antwoorden binnen hebben. Als jullie niet goed op verzenden klikken dan is je werk van de laatste 2 uur voor niets geweest en kun je opnieuw beginnen. Als je helemaal klaar bent wacht je even tot verdere instructie van mij.

Dia 11: afsluiting

De tijd is verstreken waarmee het experiment ten einde loopt. Ik wil je nogmaals enorm bedanken voor jullie deelname hebben jullie nog vragen? De game mogen jullie gewoon nog

eens spelen als jullie dat leuk vinden. Probeer de inhoud van dit onderzoek vandaag nog even voor jezelf te houden. Er komen nog twee andere groepen met studenten en het zou erg vervelend zijn als zij al een idee hebben van wat ze moeten gaan invullen...

2. Performance goal-oriented instruction

Dia 1: welkom

Welkom studenten en bedankt voor jullie deelname aan mijn afstudeeronderzoek. Ik doe onderzoek naar het gebruik van digitale games in het onderwijs en jullie deelname gaat mij en de wetenschap hopelijk helpen om meer zicht te krijgen in de effectiviteit hiervan. Ik ga jullie een kleine uitleg geven over wat er van jullie verwacht wordt tijdens dit experiment.

Dia 2: inhoud

Het experiment zal een kleine 2 uur duren. Op het bord kunnen jullie de planning zien, deze blijft het gehele experiment zichtbaar dus als je het even niet meer weet kun je daarop kijken. Zoals jullie kunnen zien bestaat het experiment uit 5 onderdelen.

- Het eerste onderdeel bestaat uit 9 meerkeuzevragen over veilig werken op stage.
- Daarna luisteren jullie naar een instructie.
- In onderdeel 3 gaan jullie een vragenlijst invullen waarin ik jullie vraag naar jullie motivatie om naar de les te komen,
- In onderdeel 4 mogen jullie een game spelen over veiligheid op de werkplek,
- En in het laatste onderdeel volgen er weer meerkeuzevragen die betrekking hebben op de game.

Dia 3: spullen check

Voor we kunnen beginnen vraag ik nog eenmaal of iedere student een pen, een laptop, een telefoon en eventueel oortjes/koptelefoon heeft meegenomen.

Dia 4: planning

Jullie krijgen per activiteit een aantal minuten de tijd om de activiteit te voltooien, op het bord is een planning geprojecteerd zodat jullie kunnen meekijken. Er zal steeds een aantal minuten voordat de tijd verstrekken is door ons aangegeven worden hoeveel tijd je nog hebt om de activiteit af te ronden. Als je nu eerder klaar bent is dat geen probleem, wacht dan alsjeblieft even geduldig [ga even op je telefoon zitten, wel zonder geluid!] totdat wordt aangegeven dat we doorgaan naar de volgende activiteit. Als je tussendoor dringende vragen hebt stiek dan even je vinger op dan komt er iemand naar je toe. Als je echter een inhoudelijke vraag hebt tijdens de vragenlijsten zul je daar geen antwoord op krijgen. Je moet altijd een antwoord invullen anders kun je niet verder.

Dia 5: informed consent

Welk antwoord je ook invult dit heeft geen invloed op jouw schoolresultaten. Jullie beantwoorden de vragen anoniem, dat betekent dat wij niet weten wie welk antwoord heeft opgegeven. Ik heb jullie toestemming nodig om de antwoorden te mogen gebruiken. Op jullie

tafel vinden jullie een formulier. Zou je dit alsjeblieft willen ondertekenen met je naam, handtekening en de datum van vandaag.

Dia 6: 9 meerkeuzevragen

We gaan beginnen aan de eerste activiteit, start hiervoor je laptop op. [wachten tot alle laptops zijn opgestart] Het beantwoorden van 9 meerkeuzevragen over veilig werken op stage. Neem de link uit de powerpoint over en start met de beantwoording van de vragen. Als je klaar bent klik je op volgende en wacht je op verder instructie. Ga de vragen die dan verschijnen nog niet lezen en beantwoorden en sluit Google formulieren niet af!

Dia 7: Performance instructie

Jullie gaan straks een game spelen die is ontwikkeld door het ministerie van sociale zaken en werkgelegenheid. Het doel is dat jullie een zo hoog mogelijke score gaan behalen in de game. [schrijf op bord: ‘Doel = hoogste high score behalen!’]

De game bestaat uit 12 levels die jullie, als jullie willen steeds opnieuw kunnen spelen. Per level kun je 3 gouden sterren krijgen en kun je ook punten krijgen voor hoe snel je medewerkers naar de uitgang leidt en hoeveel gezondheid je medewerkers nog over hebben [laat voorbeeld zien op het bord]. Het is dus de bedoeling om zoveel mogelijk punten te verzamelen in 30 minuten.

Dia 8: intrinsieke motivatie

Dan gaan we nu beginnen met de tweede vragenlijst waarvoor jullie je laptop weer mogen pakken en naar Google Formulieren mogen gaan. Jullie hebben nu 10 minuten de tijd om deze vragenlijst over jullie motivatie in te vullen. Dit gaat over jouw motivatie om naar de les te komen. Klik op volgende maar sluit het venster niet! Wacht dan weer tot verdere instructie.

Dia 9: de game

Nu jullie allemaal deze vragenlijst hebben ingevuld gaan we door naar het vierde onderdeel. Pak je telefoon en download het spel safety heroes [verwijs naar logo op bord]. Als je het niet op je telefoon kunt of wilt downloaden dan kun je er ook voor kiezen om het spel online op je laptop te spelen, weet wel dat het spel online iets trager werkt. [Wachten tot het spel door iedereen is gedownload]. Je hebt geen account nodig, klik op direct spelen.

Jullie krijgen 4 sectoren te zien als jullie straks het spel gaan spelen: industrie, bouw, zorg en transport. Let er op dat jullie tijdens deze activiteit alleen in de sector ZORG spelen. Jullie hebben nu 30 minuten de tijd om het spel safety heroes te spelen. Succes met het behalen van de hoogste score.

Dia 10: 9 praktijkvragen

[30 minuten zijn verstreken]

Ik wil dat jullie nu allemaal je mobiel in je zak stoppen en je laptop weer open slaan. Ga weer naar Google Formulieren. In het laatste onderdeel beantwoorden jullie weer 9 meerkeuzevragen over veilig werken op stage. Je hebt hier weer 15 minuten de tijd voor.

Als jullie deze vragen hebben ingevuld zorg er dan voor dat je op het knopje ‘verzenden’ klikt. Je steekt je daarna je gelijk je vinger op zodat wij kunnen checken of we je antwoorden binnen hebben. Als jullie niet goed op verzenden klikken dan is je werk van de laatste 2 uur voor niets

geweest en kun je opnieuw beginnen. Als je helemaal klaar bent wacht je even tot verdere instructie van mij.

Dia 11: afsluiting

De tijd is verstreken waarmee het experiment ten einde loopt. Ik wil je nogmaals enorm bedanken voor jullie deelname hebben jullie nog vragen? De game mogen jullie gewoon nog eens spelen als jullie dat leuk vinden. Probeer de inhoud van dit onderzoek vandaag nog even voor jezelf te houden. Er komen nog twee andere groepen met studenten en het zou niet zo leuk zijn als zij al een idee hebben van wat ze moeten gaan invullen...

3. Mastery goal-oriented instruction

Dia 1: welkom

Welkom studenten en bedankt voor jullie deelname aan mijn afstudeeronderzoek. Ik doe onderzoek naar het gebruik van digitale games in het onderwijs en jullie deelname gaat mij en de wetenschap hopelijk helpen om meer zicht te krijgen in de effectiviteit hiervan. Ik ga jullie een kleine uitleg geven over wat er van jullie verwacht wordt tijdens dit experiment.

Dia 2: inhoud

Het experiment zal een kleine 2 uur duren (maar misschien zijn jullie wel veel sneller klaar). Op het bord kunnen jullie de planning zien, deze blijft het gehele experiment zichtbaar dus als je het even niet meer weet kun je daarop kijken. Zoals jullie kunnen zien bestaat het experiment uit 5 onderdelen.

- Het eerste onderdeel bestaat uit 9 meerkeuzevragen over veilig werken op stage.
- Daarna luisteren jullie naar een instructie.
- In onderdeel 3 gaan jullie een vragenlijst invullen waarin ik jullie vraag naar jullie motivatie om naar de les te komen,
- In onderdeel 4 mogen jullie een game spelen over veiligheid op de werkplek,
- En in het laatste onderdeel volgen er weer 9 meerkeuzevragen die betrekking hebben op de game.

Dia 3: spullen check

Voor we kunnen beginnen vraag ik nog eenmaal of iedere student een pen, een laptop, een telefoon en eventueel oortjes/koptelefoon heeft meegenomen.

Dia 4: planning

Jullie krijgen per activiteit een aantal minuten de tijd om de activiteit te voltooien, op het bord is een planning geprojecteerd zodat jullie kunnen meekijken. Er zal steeds een aantal minuten voordat de tijd verstrekken is door ons aangegeven worden hoeveel tijd je nog hebt om de activiteit af te ronden. Als je nu eerder klaar bent is dat geen probleem, wacht dan alsjeblieft even geduldig [ga even op je telefoon zitten, wel zonder geluid!] totdat wordt aangegeven dat we doorgaan naar de volgende activiteit. Als je tussendoor dringende vragen hebt stiek dan even je vinger op dan komt er iemand naar je toe. Als je echter een inhoudelijke vraag hebt tijdens de

vragenlijsten zul je daar geen antwoord op krijgen. Je moet altijd een antwoord invullen anders kun je niet verder.

Dia 5: informed consent

Welk antwoord je ook invult dit heeft geen invloed op jouw schoolresultaten. Jullie beantwoorden de vragen anoniem, dat betekent dat wij niet weten wie welk antwoord heeft opgegeven. Ik heb jullie toestemming nodig om de antwoorden te mogen gebruiken. Op jullie tafel vinden jullie een formulier. Zou je dit alsjeblieft willen ondertekenen met je naam, handtekening en de datum van vandaag.

Dia 6: 9 meerkeuzevragen

We gaan beginnen aan de eerste activiteit, start hiervoor je laptop op. [wachten tot alle laptops zijn opgestart] Het beantwoorden van 9 meerkeuzevragen over veilig werken op stage. Neem de link uit de powerpoint over en start met de beantwoording van de vragen. Als je klaar bent klik je op volgende en wacht je op verder instructie. Ga de vragen die dan verschijnen nog niet lezen en beantwoorden en sluit Google formulieren niet af!

Dia 7: Mastery instructie

Jullie gaan straks een game spelen die is ontwikkeld door het ministerie van sociale zaken en werkgelegenheid. Het doel van het spelen van de game is dat jullie zoveel mogelijk leren van wat er in de game wordt verteld over veiligheidsrisico's en gezondheid op de werkvloer. [Schrijf op bord: 'Doel = kunnen benoemen wat deze game jou leert over veilig en gezond werken!'] Denk ook na over hoe de situaties in de game betrekking hebben op jouw eigen stage. Denk nog eens terug aan de vragen die jullie net hebben ingevuld en stel jezelf de vraag: wat zou ik nu anders invullen?

De game bestaat uit 12 levels die jullie, als jullie willen steeds opnieuw kunnen spelen. Per level kun je 3 gouden sterren en punten krijgen door 'je medewerkers' naar de uitgang te begeleiden [laat voorbeeld zien op het bord]. Het gaat er dus niet om een zo hoog mogelijke score te behalen, het is de bedoeling om zoveel mogelijk te leren over veiligheid en gezondheidsrisico's op de werkvloer. Het is de bedoeling dat jullie je richten op wat ze jou in de game kunnen leren over veiligheidsrisico's en gezondheid op de werkvloer. Het gaat er dus niet om dat je het spelletje zo goed mogelijk speelt maar het gaat er om dat je zoveel mogelijk leert van de game.

Dia 8: intrinsieke motivatie

Dan gaan we nu beginnen met de tweede vragenlijst waarvoor jullie je laptop weer mogen pakken en naar Google Formulieren mogen gaan. Jullie hebben nu 10 minuten de tijd om deze vragenlijst over jullie motivatie in te vullen. Dit gaat over jouw motivatie om naar de les te komen. Klik op volgende maar sluit het venster niet! Wacht dan weer tot verdere instructie.

Dia 9: de game

Nu jullie allemaal deze vragenlijst hebben ingevuld gaan we door naar het vierde onderdeel. Pak je telefoon en download het spel safety heroes [verwijs naar logo op bord]. Als je het niet op je telefoon kunt of wilt downloaden dan kun je er ook voor kiezen om het spel online op je laptop te spelen, weet wel dat het spel online iets trager werkt. [Wachten tot het spel door iedereen is gedownload]. Je hebt geen account nodig, klik op direct spelen.

Jullie krijgen 4 sectoren te zien als jullie straks het spel gaan spelen: industrie, bouw, zorg en transport. Let er op dat jullie tijdens deze activiteit alleen in de sector ZORG spelen. Jullie hebben nu 30 minuten de tijd om het spel safety heroes te spelen. Succes met het behalen van de hoogste score.

Dia 10: 9 praktijkvragen

[30 minuten zijn verstreken]

Ik wil dat jullie nu allemaal je mobiel in je zak stoppen en je laptop weer open slaan. Ga weer naar Google Formulieren. In het laatste onderdeel beantwoorden jullie weer 9 meerkeuzevragen over veilig werken op stage. Je hebt hier weer 15 minuten de tijd voor.

Als jullie deze vragen hebben ingevuld zorg er dan voor dat je op het knopje ‘verzenden’ klikt. Je steekt je daarna je gelijk je vinger op zodat wij kunnen checken of we je antwoorden binnen hebben. Als jullie niet goed op verzenden klikken dan is je werk van de laatste 2 uur voor niets geweest en kun je opnieuw beginnen. Als je helemaal klaar bent wacht je even tot verdere instructie van mij.

Dia 11: afsluiting

De tijd is verstreken waarmee het experiment ten einde loopt. Ik wil je nogmaals enorm bedanken voor jullie deelname hebben jullie nog vragen? De game mogen jullie gewoon nog eens spelen als jullie dat leuk vinden. Probeer de inhoud van dit onderzoek vandaag nog even voor jezelf te houden. Er komen nog twee andere groepen met studenten en het zou heel vervelend zijn als zij al een idee hebben van wat ze moeten gaan invullen...

Appendix 6
Motivation Questionnaire (original)

Table 5

Adaptation of AMS to measure intrinsic learning motivation in this study (Vallerand et al, 1992

in; Utvaer and Haugan (2016)

Item	Question
Knowledge	
Item 1	Because I experience pleasure and satisfaction while learning new things.
Item 2	For the pleasure I experience when I discover new things never seen before.
Item 3	For the pleasure that I experience in broadening my knowledge about subjects which appeal to me.
Item 4	Because I continue to learn about many things that interest me.
Accomplishment	
Item 5	For the pleasure I experience while surpassing myself.
Item 6	For the pleasure that I experience while I am surpassing my expectations.
Item 7	For the satisfaction I feel when I am in the process of accomplishing difficult learning activities.
Item 8	Because of the experience of a personal satisfaction in my quest for excellence.
Stimulation	
Item 9	Because for me, learning is fun.
Item 10	For the pleasure that I experience when I am immersed in learning.
Item 11	For the ‘high’ feeling that I experience while learning about various interesting subjects.

Motivation Questionnaire (pilot version)

Table 6

AMS questionnaire translated to Dutch.

Item	Vraag
	Ik ga naar de les...
<hr/>	
Kennis	
Item 1	Omdat ik plezier en voldoening ervaar wanneer ik nieuwe dingen leer.
Item 2	Om het plezier dat ik ervaar als ik nieuwe dingen ontdek die ik nog nooit eerder heb gezien.
Item 3	Om het plezier dat ik ervaar bij het verbreden van mijn kennis over onderwerpen die mij aanspreken.
Item 4	Omdat ik blijf leren over veel dingen die me interesseren.
<hr/>	
Accomplishment	
Item 5	Om het plezier dat ik ervaar wanneer ik mezelf overtref.
Item 6	Om het plezier dat ik ervaar wanneer ik mijn verwachtingen overtref.
Item 7	Om de voldoening die ik voel als ik bezig ben met het uitvoeren van moeilijke leeractiviteiten.
Item 8	Om de ervaring van persoonlijke voldoening als ik probeer de beste te zijn.
<hr/>	
Stimulation	
Item 9	Omdat voor mij leren leuk is.
Item 10	Voor het plezier dat ik ervaar als ik mij helemaal bezighoud met leren.
Item 11	Voor het prettige gevoel dat ik ervaar tijdens het leren van verschillende interessante onderwerpen.
<hr/>	

Motivation Questionnaire (final version)

Table 7

AMS questionnaire translated to Dutch.

Item	Vraag
	Ik ga naar de les...
<hr/>	
Kennis	
Item 1	Omdat ik plezier en voldoening ervaar wanneer ik nieuwe dingen leer.
Item 2	Omdat ik plezier ervaar als ik nieuwe dingen ontdek die ik nog nooit eerder heb gezien.
Item 3	Om het plezier dat ik ervaar bij het verbreden van mijn kennis over onderwerpen die ik leuk vind.
Item 4	Omdat ik blijf leren over veel dingen die me interesseren.
<hr/>	
Accomplishment	
Item 5	Omdat ik plezier ervaar wanneer ik mezelf overtref.
Item 6	Omdat ik plezier ervaar wanneer ik mijn verwachtingen overtref.
Item 7	Omdat ik voldoening voel als ik bezig ben met het afronden van moeilijke leeractiviteiten.
Item 8	Omdat ik persoonlijke voldoening ervaar als ik streef naar het hoogste niveau.
<hr/>	
Stimulation	
Item 9	Omdat ik leren leuk vind.
Item 10	Omdat ik plezier ervaar als ik meegenomen word in discussies met interessante docenten.
Item 11	Voor het prettige gevoel dat ik ervaar als ik over interessante onderwerpen leer.
<hr/>	

Appendix 7

De vragen in de pre-test en post-test zijn gebaseerd op een aantal veiligheidsrisico's die door het ministerie van sociale zaken en werkgelegenheid (2012) worden onderscheiden: psychosociale arbeidsbelasting (6), fysieke belasting (4), blootstelling aan biologische agentia (6) en de organisatie van bedrijfshulpverlening (4).

Voorafgaande aan de questionnaire worden een aantal algemene vragen aan de studenten gesteld waaronder: demografische gegevens, high score uit de game, in welk leerjaar ze zitten en in welke conditie ze zitten. Het schuingedrukte antwoord is het correcte antwoord.

Test score interpretation

The pre-test and post-test is used to assess to what extent deep learning of learning content has taken place. Each correct answer is worth one point. The test has a maximum score of 18 and a minimum score of 0. The higher the score, the more deep learning of learning content has taken place.

Pre-test

(Blootstelling aan biologische agentia)

1. Tijdens het klaarmaken van een fruithapje snij je in je vinger. Vervolgens zie je dat één van de kinderen is gevallen en een schaafwond heeft. Wat doe je?

- A. Je spoelt je vinger af en behandelt daarna de wond van het kind.
- B. *Je roept een collega zodat die de wond van het kind kan behandelen terwijl jij jouw vinger verbindt.*
- C. Je verbindt eerst je eigen vinger en behandelt daarna de wond van het kind.
- D. Je behandelt direct de wond van het kind en kijkt daarna pas naar jouw eigen verwonding.

(Fysieke belasting)

2. Je collega vraagt je om, voordat de pauze afgelopen is, nog even een nieuwe poster op te hangen boven het raam. Wat doe je?

- A. *Je haalt de ladder uit de schuur om de poster op te hangen, ook al betekent dit dat je nog niet klaar bent als de pauze is afgelopen.*
- B. Je pakt plakband en klimt op de bureaustoel om de poster op te hangen.
- C. Je vraagt je collega om de bureaustoel vast te houden terwijl jij erop klimt om de poster op te hangen.
- D. Je schuift het bureau naar de muur, klimt op het bureau en hangt de poster op. Daarna schuif je het bureau weer terug.

(Psychosociale arbeidsbelasting)

3. Moeder zet haar kind af en geeft, voordat zij weggaat, nog even bij jou aan dat haar kind vandaag iets niet mag. Gedurende de dag vergeet je dit en gebeurt het toch. Wanneer moeder het kind komt halen bedenk je ineens wat je vergeten bent. Moeder geeft aan het jammer te vinden maar neemt het je niet kwalijk. Het zit jou wel dwars, wat doe je ermee?

- A. Je blijft er nog een dagje van balen maar dit gaat vanzelf over.

- B. *Je neemt even de dag door terwijl je jezelf een momentje rust gunt. Je vraagt aan je collega of zij ook wel eens een boodschap van ouders vergeet en hoe zij hier dan mee omgaat.*
- C. Je let de volgende dag extra goed op bij alles wat er tegen je gezegd wordt.
- D. Het was niet zo belangrijk en niemand vond het vervelend maar je kiest er toch voor om het te bespreken met je begeleider. Het lijkt je belangrijk om uit te spreken hoe jij je erbij voelt.

(Psychosociale arbeidsbelasting)

4. Eén van je collega's krijgt een burnout en het is niet bekend voor hoe lang ze met verlof gaat. Dat is begrijpelijk want het is heel druk op stage. Ondanks dat jij al het maximale aantal uren in de week werkt, stelt jouw teamleider aan jou voor om de taken van de collega onder het team te verdelen. Op die manier hoeft er geen tijdelijke medewerker te worden ingehuurd. Dat kost namelijk veel geld. Wat doe je?

- A. Het werk van mijn collega kan niet zomaar blijven liggen, dat heeft vervelende gevolgen voor de kinderen. Daarom besluit ik om de taken van mijn collega over te nemen. Het kost mij wat meer tijd maar dat heb ik voor mijn collega's over.
- B. *Ik zeg tegen mijn teamleider dat ik al het maximale aantal uren werk. Ik zeg dat ik wel taken over wil nemen, als ik niet aan minder belangrijke eigen taken hoeft te werken. Op die manier werk ik niet teveel uren.*
- C. Ik bespreek met de teamleider welke taken ik zou moeten overnemen en voor hoe lang ik die taken overneem. Zo zorg ik ervoor dat ik weet waar ik aan toe ben en dat al het belangrijke werk wordt gedaan.
- D. Ik zeg tegen de teamleider dat ik wel wat taken wil overnemen. Ik besteed er gewoon weinig aandacht aan. Mijn collega lost het wel op als ze weer terug is van haar verlof. Zo zorg ik dat ik niet teveel uren werk en mijn eigen taken op tijd af heb.

(Organisatie van bedrijfshulpverlening)

5. Een aantal kinderen in je groep spelen een taalspelletje op de Ipad. Een aantal Ipads waren niet voldoende opladen. Je besluit om ze tijdens het gebruiken aan de oplader te laten zitten. Daarvoor moet je wel een verlengsnoer op tafel leggen. Na 10 minuten speeltijd zijn er een aantal kinderen die ondertussen wat drinken. Wat doe je?

- A. Je verheft je stem en vraagt aan alle kinderen om hun drinken tijdens het spelen met de Ipad weg te doen.
- B. *Je haalt direct de stekker van het verlengsnoer uit het stopcontact zonder er extra aandacht aan te besteden. Je gaat op zoek naar de meest opladen Ipad en laat de kinderen op deze Ipad verder spelen.*
- C. Je pakt een vuilniszak en bind deze met plakband over de stekkerdoos van het verlengsnoer heen.
- D. Je geeft de kinderen de instructie dat zij hun spel moeten afronden en dat jullie overgaan op een andere activiteit. Later geef je bij collega's aan dat je het vervelend vindt dat de Ipads niet opladen waren en dat zij hier beter op moeten letten.

(Blootstelling aan biologische agentia)

6. Je geeft één van de kinderen straf omdat ze niet heeft geluisterd, het kind is het niet met je eens en bijt in je hand. Je hand bloedt een beetje. Wat doe je?

- A. Mijn hand bloedt, dus ik maak hem schoon en verbind hem.
- B. Ik plak een pleister over de beet en spreek het kind aan op haar gedrag.
- C. Ik ga direct naar het ziekenhuis om mijn wond te laten nakijken.
- D. *Ik bespreek wat er is gebeurd met mijn collega en ga daarna naar de dokter.*

(Psychosociale arbeidsbelasting)

7. Er wordt een team uitje georganiseerd voor alle medewerkers van de organisatie. Jullie gaan met elkaar naar het grootste trampolinepark van Nederland. Uit ervaring weet je dat deze teamuitjes altijd erg gezellig zijn maar eigenlijk heb je helemaal geen tijd om mee te gaan. Wat doe je?

- A. Je zegt af. Je besluit je op het werk te richten wat volgende week door je leidinggevende geobserveerd gaan worden.
- B. Je meldt je ziek. Zo kun je thuis even tot rust komen, aan dat teamuitje mis je toch niets belangrijks.
- C. *Je gaat mee en besluit je werk morgen tijdens het werk af te ronden.*
- D. Je gaat mee naar het trampolinepark maar wel maar voor een uurtje. Daarna moet je echt je werk afmaken, als dit nog lukt.

(Blootstelling aan biologische agentia)

8. De moeder van Kim vertelt jou dat Kim gevoelig is voor melkproducten. Tijdens het middageten zie je dat een collega Kim een plakje kaas geeft. Je vertelt je collega dat Kim gevoelig is voor melkproducten. Jullie besluiten haar vervolgens samen te observeren maar zien niets. Hoe ga je hier verder mee om?

- A. Wanneer de moeder van Kim komt maak ik een praatje over Kim en vraag hoe erg die allergie van Kim is, maar zeg ik niets over het plakje kaas.
- B. Ik begin vooral niet over de allergie van Kim. Het is goed gegaan, Kim lijkt nergens last van te hebben en nu krijg je geen klacht van de moeder van Kim.
- C. Na het observeren van Kim kom je tot de conclusie dat Kim helemaal niet gevoelig is voor melkproducten. Je vertelt dit aan moeder.
- D. *Wanneer de moeder van Kim haar komt ophalen vertel ik dat mijn collega Kim een plakje kaas heeft gegeven. Ook vertel je dat jullie Kim goed in de gaten hebben gehouden maar niets aan Kim hebben gezien.*

(Fysieke belasting)

9. Op jouw stage is een klein kantoor. Omdat je er maar twee dagen in de week bent, is er voor jou geen normaal bureau. Je stagebegeleider heeft een tafeltje voor je gereeld, maar het is wel een beetje laag. Wat doe je?

- A. Ik ben een stagiair(e) en ik ben maar twee dagen in de week aanwezig. Ik snap dat mijn stage geen plaats voor mij heeft. Ik neem genoegen met het tafeltje, dan maar een beetje ongemakkelijk.
- B. Ik werk toch nooit achter een bureau. Die vijf minuten dat ik wat moet schrijven kan ik best even krom zitten. Ik mag al lang blij zijn dat ik het tafeltje kan gebruiken om mijn spullen op neer te leggen.

- C. *Ik vraag aan mijn collega's of ik hun bureau mag gebruiken. Zij zijn er toch nooit allemaal wanneer ik aan het werk ben. Op die manier voorkom ik rugpijn en zit ik niemand in de weg.*
- D. Ik eis van mijn stagebegeleider dat hij een goed bureau voor me regelt. Als ze geen goede werkplek voor mij kunnen regelen, vinden ze het blijkbaar niet belangrijk dat ik stage kom lopen.

Post-test

(Fysieke belasting)

1. Je ziet dat collega's, bij jou op stage, regelmatig fysieke inspanning leveren. Collega's lijken zich niet te beseffen welke gevollen er door fysieke overbelasting kunnen ontstaan. Wat doe je ermee?

- A. Ik bespreek de situaties met de teammanager.
- B. Ik bespreek de situaties die ik tegenkom met mijn collega's.
- C. Zolang ik zelf geen onveiligheid ervaar, hoef ik niets te melden. Ik ben tenslotte maar een stagiair.
- D. *Ik zoek de arboarts op en bespreek met hem/haar hoe de werkomstandigheden verbeterd kunnen worden. Ik probeer deze tips vervolgens in mijn werk toe te passen.*

(Organisatie van bedrijfshulpverlening)

2. Tijdens de pauze zie je dat twee kinderen elkaar slaan. Je loopt er naar toe en stopt het vechten. De kinderen lijken geen verwondingen te hebben. Wat doe je?

- A. Ik meld bij de ouders dat de kinderen hebben gevonden en vraag de ouders om hier met de kinderen over te praten.
- B. Ik doe verder niets, het gebeurt nu eenmaal dat kinderen ruzie hebben.
- C. *Ik meld dat de twee kinderen hebben gevonden bij mijn collega's en eventueel mijn teammanager.*
- D. Ik spreek de kinderen aan op hun gedrag en zorg dat ze sorry zeggen tegen elkaar. Maar ik maak geen melding van hun vechtpartij.

(Blootstelling aan biologische agentia)

3. Het was deze week op stage jouw taak om de boodschappen te kopen en in de keuken in te ruimen. Je hebt niet zo heel veel tijd meer om deze klus af te maken omdat je bij de kinderen verwacht wordt. Terwijl je onderweg bent naar de kinderen bedenk je dat je de blauwe fles limonade vlak naast de blauwe spiritusfles hebt gezet. Wat doe je?

- A. *Je loopt terug om de flessen direct uit elkaar te halen ook al riskeer je dan te laat op de groep te komen.*
- B. Je loopt door want je hebt haast en echt niemand gaat zich daar in vergissen.
- C. Je spreekt met jezelf af dat je na de les de spiritus fles op een andere plek zet.
- D. Je stuurt nog gauw even een appje in de groepsapp met collega's zodat zij er zelf rekening mee kunnen houden.

(Psychosociale arbeidsbelasting)

4. Bij jouw op stage is twee maanden geleden een nieuwe app geïntroduceerd. Deze app zou het werk makkelijker en sneller moeten maken. Met de app kun je overal waar je bent je gewerkte uren invullen, berichten delen met collega's, zien welke taken er nog gedaan moeten worden en nog veel meer. Sinds je deze app gebruikt, merk je dat je minder energie van het werk krijgt. Ook ben je bijna iedere avond en in het weekend met je werk bezig. Er ligt namelijk altijd wel werk wat nog gedaan kan worden. Wat doe je?

- A. Je gaat in gesprek met collega's om te kijken hoe zij de app ervaren. Je collega's geven aan dat ze er geen last van hebben. Dus besluit je dat het niet aan de app ligt.
- B. Je spreekt met jezelf af dat je na 18:30 uur niet meer op de app kijkt.
- C. Je besluit een uurtje in de week extra te gaan sporten, hier krijg je namelijk wel altijd energie van.
- D. *Je meldt bij je begeleider dat de nieuwe app het lastig maakt voor je om werk en privé van elkaar te scheiden. Jullie bespreken samen hoe je hier beter mee om kunt gaan.*

(Organisatie van bedrijfshulpverlening)

5. Bij jou op stage is een nieuwe klusjesman aangenomen om een aantal klusjes uit te voeren. Het komt gereeld voor dat hij voor zijn werkzaamheden tijdelijk een aantal objecten voor een uitgang zet. Wat doe jij?

- A. *Je schuift de objecten aan de kant zodat ze de deur niet meer blokkeren en bespreekt met je teamleider de mogelijkheid voor een brandalarm oefening voor de hele organisatie.*
- B. Jij spreekt de klusjesman hierop aan want als er brand uitbreekt dan is de nooituitgang geblokkeerd.
- C. Jij vraagt na wie er verantwoordelijk is in het team voor de bedrijfs- en ongevallen hulpverlening. Met deze collega bespreek je de gevaren van het blokkeren van een uitgang.
- D. Je schuift de objecten gewoon een stukje aan de kant zodat ze de deur niet meer blokkeren.

(Fysieke belasting)

6. Tijdens de voorbereiding van de sport-en-spelmiddag op dinsdag moet je een aantal zware kratten met materialen van de berging naar het midden van de gymzaal tillen. Je merkt dat je bijna iedere dinsdagavond last van je rug hebt. Wat doe je?

- A. Ik laat de kinderen met zijn tweeeën een krat tillen. Zo weet ik zeker dat ik geen last van mijn rug krijg en hebben de kinderen alvast een warming-up gehad.
- B. Ik ga iedere dinsdagavond even rek-en-strek oefeningen doen, zo komt mijn rug weer los te zitten en voel ik de pijn niet meer zo.
- C. Ik til de kratten voortaan niet meer op. Ik sleep ze naar de juiste plek. Zo hoef ik de kratten niet meer op te tillen en kan ik ook geen last van mijn rug krijgen.
- D. *Ik bespreek het met mijn leidinggevende en stel voor dat hij een steekwagentje koopt. Dan hoef ik de kratten alleen maar te stapelen en zet ik de kratten sneller op de goede plek.*

(Psychosociale arbeidsbelasting)

7. Doordat een activiteit uitloopt, kunnen de kinderen pas wat later worden opgehaald door hun ouders. Sommige ouders staan al enige tijd onrustig te wachten. Wanneer de ouders eindelijk hun

kinderen mogen ophalen, vraagt één van de ouders geïrriteerd waarom het zo lang heeft moeten duren. Jouw antwoord stelt de ouder niet tevreden, hij scheldt je uit. Wat doe je ermee?

- A. *Ik bespreek wat er gebeurd is met mijn collega en samen besluiten we of het nodig is om het aan de teamleider te vertellen.*
- B. Ik scheld terug, het is niet normaal dat hij boos op mij wordt.
- C. Niets, ik vind het niet leuk dat hij zo heeft gereageerd, maar dat kan nu eenmaal gebeuren.
- D. Ik spreek naar de ouder uit dat ik het onprettig vindt dat er zo tegen me gesproken wordt en bespreek later met mijn collega wat ik in deze situatie anders had kunnen doen.

(Blootstelling aan biologische agentia)

8. Lotte is jarig en zij deelt haar traktatie uit, buiten tijdens de pauze. Het is een mandarijn met een gezichtje van drop. Een aantal kinderen spelen in de zandbak terwijl zij de traktatie proberen te eten. Tijdens het spel vallen er stukjes mandarijn in het zand. Je ziet dat Mark een gevallen stukje mandarijn wil opeten. Wat doe jij?

- A. Specifiek de kinderen in de zandbak aanspreken om te zeggen dat ze eerst de traktatie moeten opeten voordat zij verder spelen. Je neemt een pakje hygiënische doekjes mee om de handjes van de kinderen schoon te maken.
- B. Tegen de collega's die aanwezig zijn vertel je wat je van het eten bij die zandbak vindt. Omdat het al zo vaak is gebeurt geef je aan dat de zandbak eigenlijk niet meer gebruikt moet worden.
- C. Je doet nu even niets met de situatie. ‘Het is nu toch al gebeurd’ denk je bij jezelf. Maar tijdens de eerstvolgende werkbesprekking kaart je aan dat jullie als team afspraken moeten maken over het eten in de zandbak.
- D. *Je gaat nu naar de kinderen in de zandbak toe en spreekt de kinderen aan op het eten van hun traktatie in de zandbak. Je neemt de traktatie in omdat je niet weet welk stukje wel of niet gevallen is. Je geeft aan dat ze de handen moeten wassen en binnen een nieuw mandarijntje kunnen halen. Na afloop bespreek je met collega's af hoe jullie de volgende keer omgaan met traktaties bij de zandbak.*

(Psychosociale arbeidsbelasting)

9. Er is een klein bedrag over in het budget van de locatie waar je stage loopt. De teamleidster geeft het team de mogelijkheid om een bestemming voor dit budget te vinden. Jij hebt collega's horen klagen over veel stress en het vele binnen zitten in de winter. Wat is volgens jou een goede besteding van het budget?

- A. Een leuk teamuitje op een zonnige dag, even weg van al dat werk. Dat helpt ook wel tegen de stress.
- B. Een massage stoel, als iedereen nog wat geld wil bijleggen.
- C. Een loungeruimte waar collega's na werktijd kunnen blijven om te ontspannen.
- D. *Meer planten in het gebouw. Planten en bomen verlagen de stress en brengen een beetje buiten naar binnen.*

Deleted questions after pilot

(Blootstelling aan biologische agentia)

1. In het lokaal van de peuter en kleuters, die nog veel op de grond spelen, mag er niet met de buiten schoenen gelopen worden. Ouders moeten, als zij op bezoek komen, overschoentjes aantrekken zodat zij straatvuil niet mee naar binnen nemen. Er is een ouder die het onzin vindt. Hij wil deze schoentjes echt niet aantrekken. Wat doe je?

- A. Ik laat het gebeuren omdat ik ruzie wil voorkomen. Ik dweil vanmiddag de vloer extra goed. Dan merkt niemand er iets van.
- B. Ik kijk of de ouder geen viezigheid onder zijn schoenen heeft. Als ik heb gezien dat hij geen viezigheid onder zijn schoenen heeft, mag hij naar binnen.
- C. *Ik leg de ouder uit waarom het belangrijk is om de overschoentjes aan te trekken. Als de ouder dan nog niet luistert, roep ik de teamleider erbij.*
- D. De ouders moeten het zelf weten. Als zij willen dat hun kinderen tussen het straatvuil aan het spelen zijn, moeten ze dat zelf weten.

(Organisatie van bedrijfshulpverlening)

2. Het is 29 graden buiten. De pauze is net begonnen en de kinderen spelen buiten. Je ziet dat de kinderen rode gezichtjes hebben en flink bezweet zijn van het spelen. Alle kinderen lijken van het spelen te genieten. Wat doe je?

- A. Ik laat de kinderen lekker spelen het is tenslotte niet altijd zulk mooi weer in Nederland.
- B. *Samen met een collega maak ik van parasols en dekens schaduw zodat een aantal kinderen daarin kunnen spelen. Daarnaast geef ik de kinderen de instructie om hun flesje water mee naar buiten te nemen en smeer ik ze bijtijds in met zonnebrandcrème.*
- C. Ik laat ze wat korter buiten spelen dan normaal zodat ze niet te lang in de zon spelen. Daarnaast geef ik de kinderen de mogelijkheid om ook binnen te spelen.
- D. We gaan niet naar buiten want kinderen zijn niet in staat om zelf maatregelen te nemen zoals extra drinken, aantrekken van luchtige kleding, rustig spelen en schaduw op zoeken.

Appendix 8

Data inspection

To ensure that the data could be used for the analyses, several assumptions had to be met.

The following section describes the data inspection for these assumptions. One way between groups ANOVAs require a dependent variable of at least interval level. This assumption is met for both ANOVAs. Furthermore, all data is independent. Participants did not influence the results of other participants. The assumption of normality is violated for deep learning $W=.13$ ($p>.001$) according to Kolmogorov-Smirnov's test. However, Allan, Bennett and Heritage (2014) argue that ANOVA is relatively robust against violations of normality when the sample is large enough and group sizes are relatively equal, which is the case. Furthermore, inspection of stem-and-leaf and Q-Q Plots does not indicate a violation of normality. The stem-and-leaf plot shows both a 0 and -0, of which only 0 is scored. This may explain the violation of normality. Homogeneity is not violated for either of the ANOVAs.

The first assumption for the linear regression analysis is that the sample size is larger than 58 ($N=50+8*K$, $K=1$ in this case). This assumption is met. The assumption of normality is met for intrinsic learning motivation $W=.05$ ($p=.2$). The normality of deep learning is discussed above. Neither normality, linearity or homoscedasticity of the residuals has been violated.

The mediation analysis also requires a sample size in ratio to the number of predictors. $N=50+8*2= 66$. This assumption has been met. Normality, linearity and homoscedasticity have already been discussed. However, the data still had to be inspected for outliers. No cases exceeded the critical value for Mahalanobis at $p=.001$ $F=13.82$. The critical value for Cook's distance $4/(103-2-1)=.04$ is exceeded six times. The critical value for Leverage is $2+2/103=.058$, which is exceeded four times. One case exceeded both Cook's and Leverage.

A total of nine outliers have been discovered. It appears that the outliers are related to extremely low scores on intrinsic learning motivation. The outliers are not included in the final analysis due to the fact that they may have disproportionate influence on the results.

Appendix 9

Mediation procedure

The results of the PROCESS mediation analysis indicates that the relationship between GOI type and deep learning is not significant $F(2,91) = 1.11, p=.33, R^2=.02$. According to Baron and Kenny (1986), the following steps can be ignored because a non-existing relationship cannot be mediated. However, to be accurate, the following section will discuss the observations from the PROCESS mediation analysis.

It was hypothesized that GOI type would influence intrinsic learning motivation. The analysis indicates that the relationship between GOI type and intrinsic learning motivation is non-significant $F(2,91) = 2.84, p=.06, R^2=.06$. The coefficients are presented in table 8.

Table 8

Regression coefficients for GOI type on Intrinsic learning motivation.

Variable	b	SE	t	p
Constant	55.55	1.59	34.99	>.001***
Performance GOI	-5.34	2.28	-2.34	.02*
Mastery GOI	-3.43	2.20	-1.56	.12

Note. * $p < .05$. ** $p < .01$. *** $p < .001$.

The mediation analysis further indicates that GOI type and intrinsic learning motivation together, do not significantly predict deep learning $F(3,90) = 2.28, p=.09, R^2=.07$. Furthermore, the direct effect of GOI type on deep learning does not decrease when intrinsic learning motivation is taken into account, because there was no significant relationship between GOI type and deep learning.

However, intrinsic learning motivation does appear to have a significant impact on deep learning $t(90) = 2.13, p=.04$. The coefficients are presented in table 9.

Table 9

Regression coefficients for GOI type and Intrinsic learning motivation on Deep learning

Variable	b	SE	t	p
Constant	-2.28	1.24	-1.84	.07
Performance GOI	.12	.48	.26	.80
Mastery GOI	-.5	.46	-1.06	.29
Intrinsic learning motivation	.05	.02	2.13	.04*

Note. * $p < .05$.