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Evaluating the Edda Fauna HSE Simulator, Pilot study 1: Establishing familiarization trials and measures

HSH-rapport 2013/2

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1 Introduction

Modern operations within oil and gas production in the North Sea involve a fleet of highly specialized, often unique ships serving a number of different operations between sea surface level and the sea floor. These vessels host a number of personnel including both permanent maritime personnel, and a range of supernumerous personnel that perform their tasks on board different ships for limited periods of time. This situation highlights the need for familiarization of personnel for each particular ship, which is the context of the development of the Edda Fauna HSE[1] Simulator. The simulator is a PC-based desktop first person perspective (FPP) simulator aimed at supplementing traditional familiarization procedures for Edda Fauna, which is an inspection, maintenance, and repair (IMR) vessel currently involved with petroleum-related deep sea operations in the North Sea. Familiarization and onboard training procedures in use today in this sector are associated with high expense, as it requires access to vessels with formidable dayrates and hence constant activity that limits access to parts or the whole of the vessel, variations in the practice of safety officers in spite of detailed procedures and practical limitations in scenarios for training. In order for such a HSE simulator to have a practical value, the learning potential of the simulator must be established, beyond the preferences and popularity of maritime personnel or HR officers' budgetary concerns. Hence, the present pilot study sought to establish a test that could yield measures of learning in the form of increased familiarity. The present pilot study also sought to document first impressions of the simulator as a suitable preparation to the real vessel, as a preparation for a full-scale evaluation of the HSE simulator, as well as addressing particular features of the simulator with the potential of further development of the simulator. Being the first operative version of the simulator, a constructive evaluation might give input to the ongoing R&D process in identifying quirks and investigating their impact and possible ways of amendment.

In particular, the following aims were formulated:

1. Design of a suitable route for wayfinding aboard the Edda Fauna.
2. Design and development of trial procedures.
3. Identification of possible obstacles to the conduction of full-scale trials.

[1] HSE refers to Health, Safety, and Environment.

4. Identification and evaluation of suitable measures of performance, as well as establishing probable effect sizes.
5. Investigating the suitability of repeated measures versus control-groups experimental designs.
6. Investigating the suitability of doing virtual wayfinding trials in the “free-mode” of the HSE simulator.
7. Documentation of learning obstacles for the effectiveness of the simulator and identification of improvement potential.

2 Shipboard familiarization and wayfinding

According to Section A-VI/1 of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) (IMO, 2010), all persons employed or engaged on a seagoing ship, other than passengers, shall receive approved familiarization training. This includes, among other things, some general procedures pertaining to firefighting and first aid, but also some ship-specific knowledge including identifying muster stations and escape routes, fire stations, life jackets and lifeboats and rafts, and hospital area with medical equipment. To this end, commercial ships tend to arrange a 'tour' of the ship guided by a security officer upon boarding the ship – the traditional approach to familiarization. In military settings, familiarization schemes tend to be vastly more elaborated, and a tradition exists for evaluating such procedures (See e.g. Carhart, Toomey, & Williams, 1992).

Wayfinding research represents an extensive body of research relevant to the purpose of the present study, although the field has paid little attention to wayfinding onboard ships. Hölscher, Meilinger, Crachliotis, Brösamle, & Knauff (2006) focus on a point of direct interest for any familiarization training onboard ships – that of the special case of multilevel buildings. The rapid direction changes involved in climbing stairs are thought to be a central problem here. In the context of Virtual Reality (VR) familiarization of multilevel environments, the problem of conveying the directional shifts visually, have also been noted (Wilson et al., 1997). Also, Soeda, Kushiyama, and Ohno (1997) identify a common error with wayfinders in assuming that the topology of the floorplans of different levels are identical. Other problematic features with the layout of modern offshore vessels have long been classical focal points for the field. Weisman (1981) presents a typology of four classes of environmental variables that shape wayfinding situations: i) visual access; ii) degree of architectural differentiation; iii) use of signs and room numbers; and, iv) floorplan configuration.

3 Existing comparable simulator concepts

There exist several established commercial products with similar functionalities as the Edda Fauna HSE Simulator. In the following paragraphs, we briefly present three well-known examples of this.

3.1 Flame-sim

Flame-sim is a US enterprise that has developed a simulation game with the same name for training of fire corpses. The game provides ample opportunities for training different levels of management and large campaigns. However, more interesting for the present purpose, it also provides the opportunity to control a fireman avatar in a FFP environment. This simulator is furthermore based on scenarios and buildings on shore, and designed for use on a PC, with the help of an gamepad like that of Xbox360 ® or Playstaion 3 ®, much in line with most of the FPP simulators currently in use in the US forces (Flame-sim).

3.2 Walkinside

Walkinside is developed by the Belgic VR-Context, and is being used by large western-based companies like, for instance, Shell Europe. The software is built around a third person perspective (TPP) simulation of installations where one or more avatars can be controlled for individual or team-based tasks and drills. The software provides a considerable flexibility and expandability, including complex drills across networks and simulation of gas leaks and disperson.

3.3 PetroSims

PetroSims is developed by the Malaysian company Kea Studios and is used by, amongst others, Shell in Malaysia. PetroSims is a FPP simulation training tool for oil & gas maintenance and operation professionals. Similiar to Flame-sim, PetroSims comes in single- and multiplayer modes including team-training. A clear difference in addition to the difference between first and third person perspectives is the PetroSims focus on drills and procedures in generic environments, rather than exact replicas of any particular installation.

Several more commercial simulators exist as well, e.g. the two products of VSTEP: RescueSim and NAUTIS. These simulators are however solely focused on the training of officers and operative leaders in the conduction of personnel for accidents of varying scale, hence they have been excluded for the present review. Together, the three reviewed commercial simulators demonstrate a certain belief and optimism in the industry for the viability of such technological solutions. However, none of them are directly comparable to the Edda Fauna HSE simulator in its main feature: that of familiarizing crew in a FPP manner close to the impression one would have while actively roaming the vessel. This clearly limits what lessons can be drawn from these other simulators in terms of evaluating the HSE Simulator. Furthermore, we have found no scientific publications that evaluate these simulators[2]. The vendors themselves only provide commercial materials and recommendations from satisfied customers.

3.4 Military research

Military research contains a strong and vibrant research tradition regarding simulation for educational purposes, in which the US holds a prominent position. The research is mainly concerned with evaluation of equipment and training programs, and is typically closely connected to the development of these (See e.g. Knerr, 2006; Shufelt, 2006). Typically, the findings are reported in reports or journals without peer-review, or as workshop or conference proceedings, and are found by searching the web, rather than through established scientific channels[3].

It follows that this tradition possesses little focus on theoretical rationale or framework, or methodological approaches. However, the tradition is eclectic and innovative in its approach to education, and utilizes everything from traditional full-scale locations and installations to adapted variants of modern commercial gaming technology for the home user market (Shufelt, 2006; Williams *et al.*, 1997). Justified by low cost, realistic training as well as the soldiers' backgrounds and academic skills, there is an increasing utilization of adaptations of commercial games for popular gaming consoles like Microsoft Xbox360(r) (Stone, 2007).

[2] There is a published Ph.D. thesis which concerns itself with the training of fire corpse leaders in Flamesim (r), but this component of the Flamesim simulatros is not comparable to the Edda Fauna HSE Simulator (Hall, 2010).

[3] Two of the main sources are: United States Army Research Institute for the Behavioral and Social Sciences, and Naval Research Laboratory.

These games are closely related to the Edda Fauna HSE simulator in technology, gaming experience and avatar controls - they are all FPP. In fact, this genre has pioneered the development of the software upon which the HSE simulator is built. However, there is of course generally a much greater element of entertaining audio and visual effects like explosions as well as interaction with machine- or human-controlled avatars.

Apparent limitations connected to the lack of scientific reporting notwithstanding, this military research tradition provides the only closely relevant research we have found (Williams et al., 1995). This research group connected to the US Naval Research Laboratory, conclude that training in a fully immersive virtual environment yields familiarization effects close to that of traditional training and vastly improved results over studying charts only.

4 Transfer of visual learning from VR

The issue of transferability of visual learning in virtual environments to real world performance has been associated with some controversy. Reviewing the literature, findings of studies relating to this issue appear to be contingent on three central aspects:

1) The use of active rather than passive VR learning designs seems to increase the likelihood of finding transfer effects, although the effect of attention and decision making may be dependent on idiothetic information (Chrastil & Warren, 2012). On the other hand, differentiation in the transfer effects due to the difference in VR technology such as desktop systems versus more immersive systems seems to be dependent on active learning designs (Waller, Loomis, & Haun, 2004). In the active learning designs, users actively orient themselves by controlling their movement in the virtual environments, rather than being “led” virtually through the environment.

2) The immersiveness of the VR experience can entail differences in the extent of visual stimuli, but the more fundamental division concerns utilization of body-based stimuli. The lack of body-based sensory modalities such as the vestibular and kinesthetic senses in desktop virtual environments are widely noted, but the influence of these modalities on people’s ability to acquire spatial information is a matter of some debate in the field (Waller, 2005). Whereas, some results suggest that that non-visual stimuli are a prerequisite for knowledge transfer, other studies suggest that desktop VR can yield significant transfer effects, and where they are compared, they may be nearly as strong as VR systems incorporating body-based information (Bliss, Tidwell, & Guest, 1997; Klatzky, Loomis, Beall, Chance, & Golledge, 1998; Waller et al. 2003; Waller et al., 2004; Waller, Hunt, & Knapp, 1998; Wilson, Foreman, & Tlauka, 1997).

3) Measurement of cognitive representations. Psychologists have established a three-stage development of the cognitive representation of large-scale navigational spaces (Siegel & White, 1975). Initially, a person will focus on important locations in the environment. The knowledge at this stage consists of sets of disconnected landmarks. More exposure to the

environment will enable a person to link the landmarks together into routes. This knowledge is termed route representation. With additional exposure, some people develop a map-like representation of the environment that is flexible and allows people to infer new routes and short cuts. This knowledge is called survey representation. Hence, measurements of learning transfer will have differing implications as they refer to different levels of cognitive representations of an environment - the weight of findings will increase as we move upwards through the three stages. Waller et al. (2004) found that while subjects with access to vestibular, proprioceptive and efferent information were approximately 10 to 15 degrees more accurate in pointing at objects, they had no superior accuracy in map construction. Klatzky et al. (1998), measuring spatial updating while moving through a route, found that simulated visual flow alone did not yield the same results as performing the same routes with physical turns. However, constructing a representation of the pathway layout appeared not to require proprioceptive cues.

A fourth aspect that could be mentioned is the time allotted to VR training. Waller et al. (1998) found that extended time was necessary to show superior transfer effects of immersive VR compared to desktop VR, although, unfortunately, the desktop condition was not tried in the extended version. Interestingly, however, the authors even found the prolonged immersive training surpassed real-world training.

5 Methodological issues

Although repeated measures designs very often are recommended for their superior experimental control on confounding variables, training effects are a general obstacle for navigational research (Darken, Allard, & Achille, 1998). Hence it is no surprise that the main approach within the VR literature appears to be control group designs. Indeed, clear learning effects of repeated trials have been documented elsewhere (see e.g. Moffat, Hampson, and Hatzipantelis 1998), indicating that for the present study, unwanted learning effects might be problematic for designs incorporating repeated measures.

Evaluation of wayfinding in both natural and virtual environments lends itself easily to direct measures of task performance. Hence within the VE domain, most evaluations utilize this, with the most common being time, distance and errors (e.g. wrong turns). For situations where participants are restricted to a given path, the number of errors is suitable. However, where participants are free to roam the environment, time and distance are best suited (Ruddle & Lessels, 2006).

It is suggested elsewhere that previous experience with computer gaming might facilitate learning in virtual environments, although some mixed results indicate that nature of the experience and concrete aspects of the virtual task matters (see e.g. Okagaki & French, 1994; Orvis, Horn, & Belanich, 2007; Richardson, Powers, & Bousquet, 2011; Subrahmanyam & Greenfield, 1994). Hence, both for pedagogical utilization of VR and for the evaluation of such utilizations, previous relevant experience might be important. Specifically, controlling video games through a keyboard and mouse is significantly different from controlling the same games with a gamepad (it can sometimes involve quite different display configurations as well), not to mention the completely different interface inherent in body controlled systems like Nintendo Wii®. The difference is so much recognized that Microsoft stopped a project to let players on the Microsoft Xbox360 platform and players using the PC (Microsoft Windows) platform interact in online gaming (Yam, 2010, July 23), although games are frequently released for multiple platforms, and although it is technically possible to let players on different platforms share a virtual space in the clouds, the playing styles and different advantages inherent in the different platform interfaces are deemed incompatible by the gamers (See e.g. Bentley, 2011, November 22).

An often overlooked issue with familiarization procedures is the assessment of personnel familiarity; competence tends to be defined by training scheme, i.e. the completion of a tour, and answering some basic multiple choice questions. Waller (2005) shows promising results for the «walkabout» concept, where virtual assessment in the form of FPP desktop VE indeed predicted real-world wayfinding, as well as contributed to understanding the cognitive abilities involved in large-scale environmental behaviors.

5.1 Methods

5.2 Design

An experimental repeated measures 2x4 design was used, with two trials of the same four posts aboard the ship immediately after completing a traditional familiarization tour. A focus group was held immediately after the trials, gathering observations of the participants and the instructor. Finally, the participants were asked to go through the same route virtually on the HSE simulator.

5.3 Participants

Four participating researchers from the Nautical Department of the Stord/Haugesund University College acted as participants. None of these had been aboard the Edda Fauna previously. One had tried the simulator six-nine months earlier, but had no sea service; Another had neither sea service, nor tried the simulator; One of the participants had a First Mate’s license, and was an active mariner as well as college teacher in the Nautical Department; finally, one had done sea service as a cadet. The gender balance was 50/50% and the age range was 35 to 45 years of age.

5.4 *Equipment and Measurements*

5.4.1 Test route

Taking the HSE simulator, official familiarization procedures on the vessel, and “Safety plans” as point of departure, the project leader developed an orientation route comprising of four posts. These four posts were taken from the ten posts given in the HSE simulator and are all presented at traditional familiarizations, as declared by official procedures and confirmed by the pilot participants. The project leader acted as test instructor and timekeeper, and walked through the route in advance.

5.4.2 Time measurements

According to Ruddle & Lessels (2006) the present situation called for time measurements, rather than counting the number of wrong turns. Each distance was timed by the instructor, not counting time spent on instruction.

5.4.3 Video recording

Each participant wore a standard issue hard-hat that had an Iphone 3gs mounted for videorecording. Hence, the perspective of the participant was recorded much like the view one has in the HSE simulator whilst roaming the vessel; showing head-turns and headings as well as distance, speed, hesitation and strategies, like investigating safety plans. The participants were not directly video recorded, although their verbalization of their way finding and auditive and communication to and from the instructor was of course recorded.

5.5 *Procedures*

Participants were instructed individually according to a written instruction form, with optional instructions to guide the completion of each post with the least possible instructor interference. The following is an excerpt from the procedures (translated from Norwegian).

> Say: ”The muster station is where one gathers for evacuation of the ship - find the muster station”

[Start stopwatch.]

[Follow the participant without going in his/her way or guiding them in any particular direction. Focus on studying the participant discretely and openly without commenting or showing expectations or surprise connected to route choices. When the participant has marked the destination, stop the watch and say: "Thank you, this is the muster station".]

[If the participant does not mark the destination sufficiently, but appears to think so, say: "Remember to mark the destination by walking up to it and say 'here'".]

[If the participant marks an incorrect destination, say: "No, this is not the muster station."]

As all participants waited in the reception area of the vessel, their overhearing of the first instructions including the destination of the first post could not be prevented. But participants were instructed not to discuss the tasks or share information. Furthermore, the participants were briefed on the use of video recording in advance, and were given the opportunity to refrain from video recording or having their recordings deleted. All participants were gathered after the trials for an informal debrief and a focus group session over experiences of the test and way-finding strategies used. Finally, the participants were asked to go through the same route virtually on the HSE simulator.

5.6 Analysis

The Statistical Package for the Social Sciences (SPSS) v.19.0 was used to perform descriptive statistics and paired samples t-tests, an exploratory principle components analysis (PCA), a scale reliability analysis, and independent *t*-tests. Z-scores and multiple base line graphs have been performed in Microsoft Excel 2010®. Effect sizes (Cohen's *d*) and their confidence intervals were computed in R version 2.15.1 (64-bit) by means of the compute.se-and MBESS packages. Power analyses were computed in R with the pwr package.

6 Findings

Descriptive statistics of the time scores taken at the trials are presented in Table 1 for both raw-scores and z-scores.

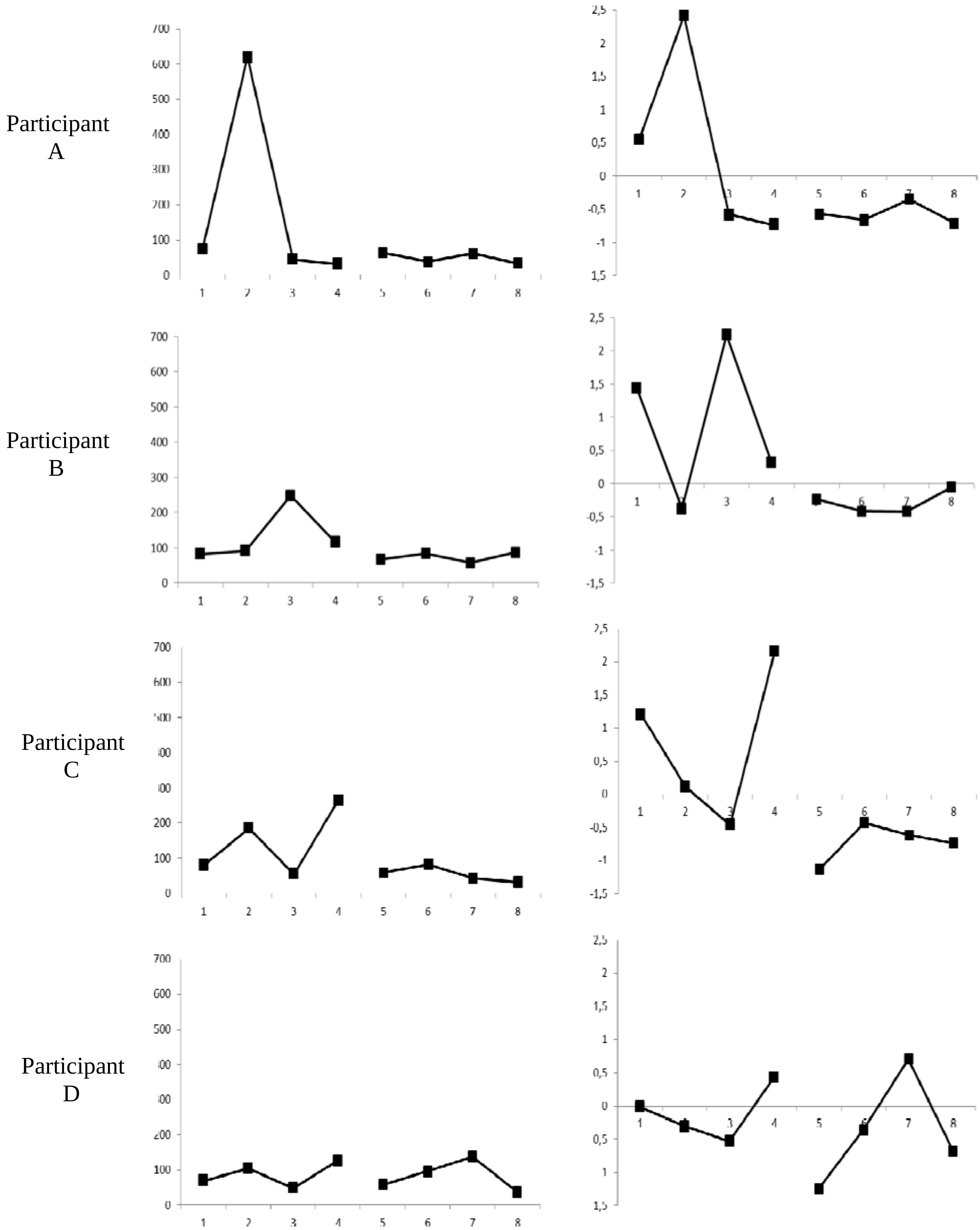
Table 1. Cumulative time (in seconds and z-scores) for posts in Trials I and II, N=4.

	Trial I		Trial II						Power[a)]	
Time	***M***	***SD***	***M***	***SD***	***df***	***t***	***d***	**95% CI for *d***	**One-tailed**	**Two-tailed**
Raw-score	140.00	43.21	64.88	15.66	3	2.601*	1.31	[-.13, 2.65]	.64	.44
Z-score	.49	.45	-.49	.20	3	3.871*	1.94	[.15, 3.67]	.89	.73

*[b)] Raw scores in seconds. [c)] Z-scores computed for each post across trials. * p < .05 (one-tailed).*

6.1 The design of a suitable route for way-finding aboard the Edda Fauna.

Time scores for the two trials reveal that all four participants managed to complete each post. At the same time, there were both marked individual differences and clear learning effects, hence no obvious floor- or ceiling effects are apparent (see Table 1 and Figure 1). However, the possibility of adding two more posts to the route without significant increases in the length of procedures was identified.



Figur 1 Time measurements of posts 1-4, trials I and II in seconds (left) and standardized (right).

6.2 Identification and evaluation of suitable measures of performance, as well as establishing probable effect sizes.

Comparing cumulative scores of Trial I and Trial II (see Table 1), the difference is significant both for raw-scores and z-scores already with four participants, significantly exceeding Cohen's (1988) convention for a large effect (d = .80). Power analyses also demonstrate that a realistic number of 10 participants per group will produce power values ranging from .79 to above .995, satisfying Cohen's (1988) suggested default level of .80 (see Table 2). There is also a marked decrease in variation as indicated by SD values, reflecting the participants' arrival at the best routes and approaching a floor effect in terms of how fast it is possible to walk (at normal speed) through the vessel.

Table 2. Power analyses for n=4 and n=10 at a .05 alpha level, based on effect sizes achieved in pilot study.

	Paired samples				**Independent samples**			
	N=4		**N=10**		**n=4[a)]**		**n=10[a)]**	
Effect size (d)	**One-tailed**	**Two-tailed**	**One-tailed**	**Two-tailed**	**One-tailed**	**Two-tailed**	**One-tailed**	**Two-tailed**
1.31	.64	.44	.98	.96	.50	.35	.88	.79
1.94	.89	.73	★	★	.78	.63	.99	.98

a) n represents the number of participants in each group (or sample).

★ = power values greater than .995

6.3 Investigating the suitability of repeated measures versus control-groups experimental designs.

The above-mentioned statistics clearly indicate a strong learning effect from Trial I to Trial II. The learning effect is also apparent in the multiple baseline graphs produced for each of the four participants (see Figure 1). It is here evident that there is both a level reduction and a trend flattening. This means that for repeated-measures designs where participants repeat the same route with both virtual and traditional familiarization, the effects of the familiarization mode would be drowned out in a steep learning curve.

6.4 Investigating the suitability of doing virtual way-finding trials in the "free-mode" of the HSE simulator.

Attempts at getting data on a virtual test of the route used on onboard quickly revealed that ample time for familiarization with the simulator format was necessary in advance in spite of every participant being advanced PC-users. Evidently, mastery of the simulator requires some relevant PC-gaming experience with FPP games. General PC-competence or FPP gaming experience with console gaming was not sufficient. Hence this virtual trial was quickly aborted.

6.5 Design and development of trial procedures.

On the whole, the procedures developed prior to the trials were deemed efficient and appropriate by the focus group. They were short, easy to perform, and communicated in a uniform and appropriate manner for all participants.

6.6 Identification of possible obstacles to the conduction of full-scale trials.

Observations were made concerning the possibility of securing experimental control over information regarding the ship or the route; with a particular focus on controlling participants' opportunity to visualize the vessel from the inside or outside, or mentally rehearsing the route in advance of being formally given the orientation task. The reception area of the vessel is rather small, and observations indicated that any extra participants waiting there will be contaminated by information about the route which easily leads to mental rehearsal of the route. Observations also indicated that the participants roam large areas of the interior throughout the route, and in an unpredictable manner. In addition, many of them verbalize a lot, so that they will easily contaminate each other where more than one trial is performed in parallel. It was also observed that the instructor role was quite demanding, so that trials should not be held back to back by the same instructor.

The screen capture from the HSE Simulator on the left shows the clearly orange visible life raft and blue skies indicating access to outside deck. On the right, a still photo from the actual vessel shows these features obstructed by a door that was closed at all times.

Figur 2 VR and real life snapshots from the route to the muster station

6.7 Documentation of learning obstacles for the effectiveness of the simulator and identification of improvement potential

The visual design of the simulator was perceived by the researchers in the main to be identical with the actual vessel, and to be of adequate resolution and quality. However, one striking exception is evident in the lack of doors in the interior[4] (see Figure 2). The only doors present in the simulator are outside of the interior, and they cannot be opened in the simulator. Beyond the purely visual issue, it was also noted that the doors' opening mechanism was less than intuitive and caused some distraction upon traversing.

As commented in point iv), mastery of the HSE simulator requires some familiarity with FPP gaming on PCs and an important difference lies with the controllers. Hence, for many in the target group, controlling the HSE simulator with a keyboard and mouse rather than with a gamepad will be a significant learning obstacle.

[4] With the "interior" we mean to signify the office- and living quarters, bridge included, which is designed very much like any modern hotel or conference venue, and which sharply contrasts the outside main deck, machine rooms and suchlike, which is mostly comprised of rugged steel surfaces and dominated by heavy machinery.

7 Discussion and conclusion

The present pilot study set out to test the suitability of the route designed for wayfinding aboard the Edda Fauna. Although the route with its trial procedures was deemed successful, it is clear that running the experiment full-scale must take measures to prevent contamination from participants interacting, and observing each other.

As expected from the literature, the time measures were well suited to measure performance in the present free-roaming wayfinding task (Ruddle & Lessels, 2006). Furthermore, power analyses indicated that group sizes of about 10 should suffice to demonstrate effects for the full-scale experiment. However, findings clearly indicate that multiple measuring points per participant increase the effect sizes. In addition, multiple measuring points gives increased redundancy against trial errors. Hence, the design can easily be improved with increasing the number of posts on the way-finding route.

Also, as predicted from the literature, training effects demonstrate that the full-scale experiment must be designed as a control group, rather than a repeated measures design (Darken, Allard, & Achille, 1998).

We suggest that the present failure to complete the virtual wayfinding trials in “free-mode” reveals the need for more tests rather than the lacking potential of the HSE Simulator. As Waller (2005) successfully used a VE for assessment purposes, and we are unaware of relevant research to put forth contrary evidence, this issue deserves more research effort.

However, the present failure highlights earlier findings that previous experience with computer gaming might facilitate learning in virtual environments (see e.g. Okagaki & French, 1994; Orvis et al., 2007; Richardson et al., 2011; Subrahmanyam & Greenfield, 1994). Furthermore, the same studies implicate that these findings are somewhat dependent upon the nature of previous experience, relative to the concrete aspects of the tasks in question. Of relevance here for the Edda Fauna HSE Simulator, is that FPP games requires – and trains – some specific competence in controlling avatar body movement and head rotation/tilting as well as the forming of mental representations of three dimensional space. Both of which are different from other typical arcade like third-person perspective gaming, or more classical simulator games where a craft, vessel or vehicle is controlled. This is partly a cohort-related phenomenon, as coming generations of sea-faring personnel will be increasingly more accustomed to FPP gaming. However, this is also an issue about gamers' experience with PC vs. consoles (e.g. Playstation or Xbox). Gamers will normally have strong preferences towards one of the platforms, and there is no evidence that one of the platforms will acquire a monopoly situation in the gaming market. Notably, software exists that allows the use of console gamepads with PCs, and further research should look into how optional controllers influence learning outcomes (Motioninjoy; Xpadder).

Visual access is recognized in the literature as a major environmental variable influencing wayfinding (Weisman, 1981). Hence, the obvious difference in visual access created by the simulators treatment of doors is a problem. In fact, even an animation of the opening mechanism in the simulator while traversing the doors might facilitate familiarization with the vessel because of their non-intuitive design.

Obvious limitations pertaining to the limited sample and data not withstanding, we conclude that the present pilot study has managed to successfully test important issues connected to the design and procedures of a full scale experiment, as well as identifying some relevant obstacles and conditions for the use of the HSE Simulator as a training and assessment instrument.

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The need for familiarization of personnel on petromaritime vessels is increasing. This is the context of the development of the Edda Fauna HSE Simulator, a desktop FPP simulator aimed at supplementing traditional familiarization procedures for the IMR vessel Edda Fauna.

In order for the simulator to have a practical value, the learning potential of the simulator must be established. Hence, the present pilot study sought to establish a test that could yield measures of learning in the form of increased familiarity aboard the vessel.

An experimental repeated measures 2x4 design was used, with two trials of the same four posts taken from the official training program, followed by focus groups and attempted virtual trials. The participants (N=4) represented a mix of genders and varying previous shipboard experience. Effect sizes with confidence intervals and power analyses were calculated by using the statistical package R.

The findings indicated that a suitable route and procedures were established that could measure the effect of familiarization procedures. Power analyses indicated that a sufficient statistical power could be achieved with a reasonable group size (n=10).

However, learning effects show that a repeated measures design is not feasible. Virtual assessment failed, highlighting the requirement of participants' relevant video gaming experience.

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