# Internal education in the chemical industry, with a focus on legal compliance and active learning

The case of INEOS Inovyn

Master's thesis in Learning and Leadership, MPLOL

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Master's thesis 2023

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Master's Thesis 2023
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Typeset in LaTeX
Printed by Chalmers Reproservice
Gothenburg, Sweden 2023

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# Abstract

Education is a broad concept, that is used in all different organizations, in different forms. It is not only an important and effective tool to use when introducing new employees, but is also demanded for certain processes or tasks. These demands are mentioned in different legal requirements, which not least affect chemical industries, whose operations involve many risks and therefore high safety requirements.

The aim of this study was to the investigate the chemical company INEOS Inovyn's education, from two perspectives. The first perspective concerns the company's compliance with legal requirements, that belong to their *Environment*, *Work Environment* and *Process Security* departments, specifically within their education. The second perspective instead concerns the company's internal education. The internal education was examined to investigate their use of the learning method called *active learning*, to provide the company with suggestions for improvements. These improvements will regard both legal compliance and the use of active learning.

In order to conduct the study, necessary methods were developed to investigate the compliance with the law and the use of active learning. These methods were also developed with the aim of making the research usable for future, similar studies. The study resulted in a number of legal requirements having a certain or complete lack of legal compliance, within the company's educational courses. Success factors for compliance with legal requirements were identified, both based on the text and structure of the legal requirements and perceived importance of the requirements within the company. In the investigation of the use of active learning, the results showed that the use of active learning was relatively low and could be developed to make learning processes more efficient.

The conclusions of this study include, among other things, a few suggestions that could lead to a higher level of legal compliance. For example, to use more consistent references to the requirements in the company's educational material to ensure that all requirements are complied with. Further, the study identified a need for the use of active learning to a greater extent. Other active elements, or a higher frequency of the elements that are already used, could lead to more effective education and an increased learning at the company.

Keywords: legal requirements, compliance, active learning, education.

# Acknowledgements

First of all, I would like to give a big thanks to the company and employees at INEOS Inovyn in Stenungsund, where my study took place. The employees have been very kind and helpful, which has made me feel very welcome. Especially, those who participated in interviews that were helpful in the investigations.

A special thank you to my supervisor at the company, Anne-Louise Thäng, for all the help and motivation during this time. She has been helping me to understand the research area and has always been available for discussions and reflections, and thus made the study possible. Furthermore, she has also been someone to lean on during the stressful times, which I appreciate very much.

I am also very grateful for my supervisor at Chalmers University of Technology, Magdalena Svanström. She has been providing me with a lot of help during my writing process, so that my report could become as good as possible. Thank you for all of the support and kind words during the study.

Both of these women are big inspirations to me, both in my private life and in my future working life. I am very grateful for getting to know them.

Frida Svenungson, Gothenburg, May 2023

# List of Acronyms

Below is the list of acronyms that have been used throughout this thesis listed in alphabetical order:

| | |
|---|---|
| AFS | The Swedish Work Environment Authority's Constitutional Collection (In Swedish: Arbetsmiljöverkets författningssamling) |
| IMS | Inovyn/INEOS Management System |
| ISPS | International Ship and Port facility Security |
| HES | Health-Environment-Safety |
| HESQ | Health-Environment-Safety-Quality |
| MSBFS | The Authority for Social Protection and Preparedness's Constitutional Collection (In Swedish: Myndigheten för samhällsskydd och beredskaps författningssamling) |
| NFS | The Swedish Environmental Protection Agency's Constitutional Collection (In Swedish: Naturvårdsverkets författningssamling) |
| REACH | Registration, Evaluation, Authorisation and restriction of Chemicals |
| SAM | Systematic Work Environment (In Swedish: Systematiskt arbetsmiljöarbete) |
| SFS | Swedish Code of Statutes (In Swedish: Svensk författningssamling) |

# Contents

# 1
# Introduction

The following sections consist of the background to this master thesis and its purpose. Furthermore, the master thesis's research questions are presented.

## 1.1 Background

INEOS Inovyn is one of the world's biggest petrochemical industries and has locations in several European countries [1], and is mostly famous for its production of vinyl chloride. The company's various products are used in everything from cars, to colours and glue, health care and medicine, to pulp and paper. This master thesis took place at INEOS Inovyn's location in Stenungsund, on the west coast of Sweden.

For all petrochemical industries that work with high-risk processes and toxic chemicals, there are many legal requirements that must be complied with. These treat, for example, environmental risks, process security, and work environment risks. These legal requirements are formulated differently and some of them require education of the employees in different forms. INEOS Inovyn is one of these companies with many legal requirements to follow, which was examined in this master thesis. Specifically, the legal requirements connected to the company's educational courses was investigated to ensure all requirements were included and complied with properly. Also to provide information about potential shortcomings or suggestions for improvement. This investigation was mainly executed by using document analysis and informal interviews with employees.

Furthermore, another aspect of the company's education's quality was investigated, the use of the learning method called *active learning*. According to *Cornell University's Center of Teaching Innovation*, active learning is different methods to use to engage students during their learning. These methods are for example thinking, discussing, investigating, and creating [2]. By using these types of methods, students' experiences of the learning and motivation towards the learning improves.

Active learning is mostly referred to teaching school students, but the belief is that it can also be used during education in the workplace. To engage participants in different educational courses is experienced as something useful, to be able to increase their learning by using simple methods. Therefore, INEOS Inovyn's different educational courses will be further examined to identify the quality and quantity of active learning methods. This examining will be conducted using document analysis, interviews and a survey study.

The reason for the two separate investigations is that there were different needs of improvements within the company's education. The division was therefore made to provide the company with insights about several aspects of their education, and provide different development proposals that the company could find useful.

Almost all of the company's educational courses used for compliance of the legal requirements were executed by external firms, which made them more difficult to examine thoroughly. The difficulty was due to that it would involve contacting the different firms to be given access to their learning material. Therefore, the active learning within INEOS Inovyn's education, which is given by their own employees, was selected as the study subject. The company's own educational material was easier to access and examine, and the conditions for analyzing the internal courses were simply better. Through this investigation, improvement suggestions could be provided that the company could implement directly.

## 1.2 Purpose

This master thesis is supposed to conduce a useful report for INEOS Inovyn, with the expectation to help them improve their education and obedience to the law. By investigating how well they follow the legal requirements, plans or recommendations for improvements will be created for the company to use. Success factors for compliance with the legal requirements will be investigated and identified, to understand the reasons why some legal requirements are complied with and others are not.

By examining the amount of active learning in the internal education, possible shortcomings can be detected. Since active learning is an important aspect of the quality of learning, this is meaningful to investigate. By increasing the quality of the education, the employees can be provided with expanded knowledge and higher skills. Therefore, a literature review of active learning was executed in order to provide science-based and useful knowledge about the subject.

The report also aims to be of use to other companies that work with either active learning or work according to different legal requirements. This can apply both to other chemical industries and other lines of businesses. The report is also directed to the creators of the legal requirements, to give them knowledge of difficulties in compliance with the legal requirements and to make the requirements more clear and easy to comply with.

## 1.3 Research questions

From the purpose of the master thesis, the following research questions, divided into two parts, were developed:

**Part 1. Investigation of compliance with legal requirements**

- How well does INEOS Inovyn's HES (Health-Environment-Safety) education comply with the legal requirements that exist for petrochemical companies in Sweden?
  - What might a method look like to investigate a company's legal compliance?
  - How are legal requirements applied in the company's educational courses?
  - What are the success factors for compliance with legal requirements?

The first category of research questions include the construction of the method that was needed to be able to execute the investigation, and from this method, identification of deviations from the demands in the legal requirements. The research questions also aim to examine to what extent the requirements are complied with and which success factors that lead to compliance. The hope is that the findings can be of use in future creation of routines within the company, that can improve the compliance with the legal requirements in their education.

**Part 2. Investigation of active learning in internal education**

- How well is active learning integrated into the company's internal educational courses today?
  - What might a method look like to investigate a company's use of active learning?
  - How could active learning have been further implemented to bring about more effective and increased learning within the organization?

The second category is similarly constructed as the first one. It consists of the construction of the method used for the investigation, and from this method, an examination of to what extent active learning is used and could be further developed.

# 2
# Theory

In the following sections, the theoretical framework used in the report will be presented. These apply to the two different parts of the investigation, where Section *2.1 HES legal requirements* and *2.2 Definition of education* applies to the investigation of the compliance of the legal requirement and Section *2.3 Active learning* to the investigation of the use of active learning.

## 2.1 HES legal requirements

In this master thesis, the investigation of compliance with legal requirements is based on several legal requirements affecting the HES department at INEOS Inovyn. In *Sections 2.1.1 and 2.1.2* the legal requirements' constructions are described, and the rule structure for how all legal requirements are linked together.

### 2.1.1 Structure of legal requirements

The legal requirements are constructed with sections or paragraphs, which describe various parts of the legal requirements. The sections or paragraphs vary in the different requirements, and also the order of the sections. Some of the legal requirements are similarly constructed, with similar sections and structure, but other requirements are completely different regarding the sections and structure.

To describe the construction of the requirements further, the example of the Swedish Work Environment Authority's legal requirement *AFS (2006:6) Use of lifting devices and lifting accessories* [3] can be seen in *Examples 1-3. Example 1* presents an example of how a legal requirement can be divided into different sections, and *Example 2* presents how an educational demand can be described in a section of the legal requirement. The legal requirements also contain a chapter called *Guidance on certain sections*, where some of the sections are further described. *Example 3* presents a section in the requirement *Use of lifting devices and lifting accessories*'s *Guidance on certain sections*, that further describes *Section 29 Knowledge*, seen in *Example 2.*

*Example 1* presents part of the table of contents from the Swedish Work Environment Authority's legal requirement *AFS (2006:6) Use of lifting devices and lifting accessories* [3]:

**Example 1. Division of sections in a legal requirement**

**"List of contents**

- *Provisions of the Swedish Work Environment Authority on Use of Lifting Devices and Lifting Accessories*
- *Scope*
- *Definitions*
- *Investigation and risk assessment*
- *Remedial measures*
- *Follow-up*
- *Stipulations concerning products*
- *Stipulations concerning use*
- *General*
- *Stability and ground conditions*
- *Suspended load*
- *Securing of load*
- *Outdoor use*
- *Overload protection device and limit switches*
- *Personal fall restraint equipment*
- *Access to operating position*
- *Lifting of persons*
- *Risk of collision*
- *Tandem lifting*
- *Choice of lifting accessories*
- *Storage of lifting accessories*
- *Hoists/Lifts*
- *Lifting devices for lifting a freely suspended load*
- *Signaller*
- *Load coupling*
- *Manual alignment of load*
- *Energy outage*
- *Surveillance of load*
- *Knowledge*
- *Maintenance and inspection*
- *Annex A Technical stipulations.*

*... "*

*Example 2* presents the Swedish Work Environment Authority's legal requirement *AFS (2006:6) Use of lifting devices and lifting accessories*, which shows *Section 29 Knowledge* in the requirement [3]:

### Example 2. Description of educational demand in a legal requirement

**"Knowledge**

*Section 29*

*A lifting device or lifting accessory may be used only by a person who is closely familiar with the work and has the theoretical and practical knowledge needed for safe use. This knowledge shall include current work environment rules and relevant aspects of the lifting device's and lifting accessories': 1. structure, 2. operation, 3. maneuvering, 4. properties, 5. uses, 6. limitations, 7. maintenance and 8. inspection. An employer ordering an employee or outsourced worker to use lifting devices or lifting accessories shall have documentation concerning that person's practical and theoretical knowledge with regard to safe use of the equipment. A worker to whom subsection one of this section does not apply but who uses lifting devices or lifting accessories at a common worksite shall have corresponding documentation available at the worksite. Employees and outsourced personnel shall have written permission from the employer and hirer respectively to use a mechanically powered lifting device. The permission shall indicate the types of lifting device, lifting accessory and duties included. These requirements concerning documentation and permission do not apply to the use of hoists/lifts."*

Furthermore, *Example 3* presents the Swedish Work Environment Authority's legal requirement *AFS (2006:6) Use of lifting devices and lifting accessories*, which shows *Section 29 Knowledge* in the requirement's chapter *Guidance on certain sections* [3]:

### Example 3. Further description of educational demand in section *Guidance on certain sections* in a legal requirement

**"Knowledge**

*Section 29*

*Knowledge on all the points enumerated is important to drivers of lifting devices. In the case of slingers, signallers and personnel carrying out maintenance, repair and alteration work, knowledge of relevant aspects may suffice. The knowledge needed to meet the stipulations can vary, depending on the complexity of the lifting device and lifting accessory. In the case of drivers of more complicated lifting devices, e.g. tower cranes and mobile cranes, the stipulations can be considered met if the driver has passed an examination after completing a quality-assured driving course which includes theoretical instruction and driving practice. Training arranged by the National Joint Council of the Building Industry (BYN) and leading to a vocational certificate issued by a Regional Vocational Committee is one example of such an examination. Training programmes arranged in Denmark, Norway, Iceland and Finland and conferring competence recognised by the occupational safety and health authority of the country concerned are another such example. Swedish Standards include recommendations concerning the training of crane drivers and drivers of mobile work platforms, and also of slingers and signallers. Rules in minors in working life are contained in special Provisions issued by the Work Environment Authority. Under those Provisions, minors, with few exceptions, may not be employed as drivers or operators of mechanically powered lifting devices. Collective agreements concluded between the Swedish Construction Federation/the Earth-Moving Contractors' Association and the Swedish Building Workers' Union/the Union of Service* *and Communication Employees (SEKO) require crane drivers in these collectivebargaining areas to have certificates of competence."*

It is important to note that not all legal requirements necessarily look like the presented examples. Some requirements only mention an educational demand in a section containing information about another part of the requirement, and do not have a specific section called *Knowledge* or *Education*. Other requirements only mention the educational demand in the chapter *Guidance on certain sections*, and not in the main description of the requirement, but the educational demand still applies. The difference between the requirements' constructions means that all legal requirements need to be interpreted separately, to ensure the compliance of the educational demand.

Furthermore, it is important to note that the legal requirements can mention or refer to an educational demand in different ways. In the presented example, the educational demand is referred to as a request for a certain *Knowledge*, but in other requirements, the reference can be formulated differently. In some requirements, the educational demand can be mentioned as a demand for a *qualification* or a *certification*, which means that some form of educational certificate is required to be able to perform the work in question. The two concepts mean roughly the same thing, which can make interpretation complicated. Some requirements instead mention that the employer should provide their employees with certain *information*, which can also be considered as an educational demand.

### 2.1.2 Work environment regulations

The legal requirements that regulate the *HES* department at INEOS Inovyn are divided into the areas of *Environment*, *Work Environment* and *Process Security.* The different ordinances and requirements are in turn based on more comprehensive laws, such as *The Swedish Environmental Act* (SFS 1998:808), *The Swedish Work Environment Act* (SFS 1977:1160) and *The Act on Flammable and Explosive Goods* (SFS 2010:1011).

The legal requirements that concern the work environment are many, and the connections between them are described by the *Swedish Work Environment Authority* (in Swedish: *Arbetsmiljöverket*) in *Figure 2.1.* In the bottom of the tree in *Figure 2.1*, the Work Environmental Act (in Swedish: Arbetsmiljölagen) is presented as the legal basis (root) of the work environment, that all of the requirements above are based on [4]. This act, can also be described as a framework law, where general information regarding the work environment is presented.

Above the Work Environmental Act in *Figure 2.1*, the legal requirement regarding *Systematic Work Environment* (In Swedish: *Systematiskt arbetsmiljöarbete*) can be seen, as the tree's stem. This requirement contains all basic activities for the work environment [4] and can also be further explained as a general and fundamental regulation. The regulation describes how the employer must work systematically with the work environment, which applies to all different areas at a company.

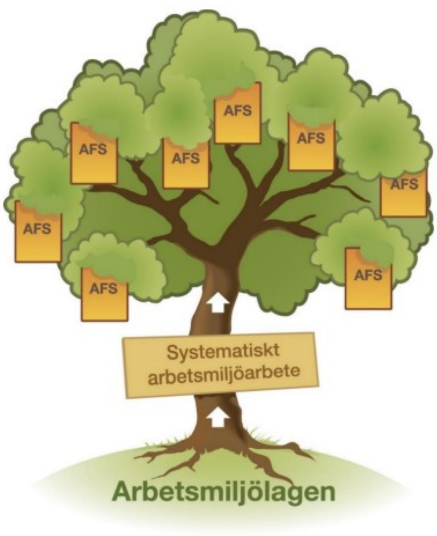



**Figure 2.1:** The Swedish Work Environment Authority's description of the connection between the work environmental acts and requirements [4]. The Swedish Work Environment Authority works to educate businesses in the field of work environment and has a number of presentations and documents on their website that they encourage to use for training purposes [5]. This figure is originally from one of these presentations, in order to describe the connection between the work environment requirements.

Above the stem in *Figure 2.1*, there are branches called *AFS*, which means *The Swedish Work Environment Authority's Constitutional Collection* (In Swedish: *Arbetsmiljöverkets författningssamling*). The Swedish Work Environment Authority explains these as *The content of the work environment tasks can be found in other regulations in the Work Environment Authority's constitution (AFS)* [4].

An AFS, is a legal requirement that contains more detailed information regarding a specific area of the work environment, and can also called a *substantive regulation* or a *provision*. The connections between the Work Environmental Act, Systematic Work regulation and the substantive regulations are further presented in the Swedish Work Environment Authority's *Rule Structure* (2021), seen in *Figure 2.2* (see original figure at the Swedish Work Environment Authority [6]).

In *Figure 2.2*, it can be seen that the substantive regulations are categorized in *Use of work equipment*, *Design of the workplace*, *Type of work*, *Chemical work environment risks*, *Psysical work environment risks*, *Organizational, psychological and social work environment risks*, *Microbiological work environment risks*, *Ergonomic work environment risks* and *Individual regulations.* Not all of the legal requirements in the Rule Structure affect INEOS Inovyn and will therefore not recur in the report.

Both the substantive regulations and the more general regulations, the Work Environmental Act and the Systematic Work Environment regulation, may contain educational demands, and the examination of them will therefore be executed in the same way. To simplify the investigation, the substantive regulations, the Work Environmental Act and the Systematic Work Environment regulation will all be referred to as *legal requirements* in chapter *5. Results*. In chapter *6. Discussion*, the previous concept of *substantive requirement* might occur, to be able to discuss the differences between them and the more comprehensive requirements, the Work Environmental Act and the Systematic Work Environment regulation.

Something that is not clearly shown in the Rule Structure is that some of the substantive regulations are more comprehensive than others. To describe this further, the example of requirement *Use of lifting devices and lifting accessories* can used. This legal requirement contains demands that other legal requirements, *Inspection of lifting devices* and *Temporary passenger lifts*, also need to meet. That means, that these requirements are connected.

It is also worth mentioning that the legal requirement *Chemical work environment risks* is a more comprehensive legal requirement, which is more general and contains demands concerning different types of chemical substances. To return to this later in the survey, the working definition of these types of legal requirements were simply chosen to be *comprehensive substantive regulations* and the less comprehensive regulations belonging to a comprehensive substantive regulation will be referred to as *belonging substantive regulations.*

Since this report is based on Swedish regulations and thus mostly concerns Swedish readers, Swedish translations of the previously presented words are presented below, to further clarify the concepts.

*Legal requirement* - in Swedish: *Lagkrav*
*Regulation* - in Swedish: *Reglering/Föreskrift*
*AFS/Substantive regulation* - in Swedish: *Sakföreskrift*
*Ordinance* - in Swedish: *Förordning*

**Rule structure**

*for the Swedish Work Environment Authority's regulations based on the Work Environment Act*

| Employer | | | | | | | | | Manufacturers, importers, distributors & suppliers | |
|---|---|---|---|---|---|---|---|---|---|---|
| Systematic Work Environment (SAM) | | | | | | | | | Internal market regulations (EU) | National product regulations |
| **Use of work equipment** | **Design of the workplace** | **Type of work** | **Chemical work environment risks** | **Physical work environment risks** | **Organizational, psychological & social work environment risks** | **Microbiological work environment risks** | **Ergonomic work environment risks** | **Individual regulations** | | |
| Lifting devices and lifting gear | Design of the workplace | Building and construction work | Chemical work environment risks | Vibrations | First aid and crisis support | Risk of infection | Load ergonomics | Medical controls | Machines | Some of the Swedish Work Environment Authority's regulations are aimed both at the group of users and at the group of manufacturers, suppliers, etc. For example, the regulations on scaffolding, ladders and blasting. |
| Inspection of lifting device | Landslip | Mining and quarrying | Hygienic limit values | Noise | Work adaptation and rehabilitation | Laboratory animals | Work with monitor | Health examinations of flight personnel | Ban on conductive cutting tools | |
| Temporary passenger lifts | Tumble | Blasting work | Anesthetic gases | Electromagnetic fields | Violence and threat | | | Minors | Pressure-bearing devices | |
| Chain saws and clearing saws | | Diving work | Cytostatics | Artificial optical radiation | Solitary work | | | Use of personal protective equipment | Simple pressure vessels | |
| Presses and scissors | | Mast and pole work | Synthetic inorganic fibers | | Organizational and social work environment | | | Pregnant and nursing | Equipment potentially explosive atmospheres | |
| Use and control of pressurized devices | | Hairdressing | Quartz | | | | | | | |
| Testing with over and under pressure | | Smoke and chemical diving | Lead batteries | | | | | | | |
| Ladders and work stands | | Harbor work | Pesticides | | | | | | | |
| Scaffoldings | | Animals | Gases | | | | | | | |
| Forklifs and trucks | | Melting and casting of metal | Asbestos | | | | | | | |
| Tractors | | The motor industry | Explosive environments | | | | | | | |
| | | Fusion welding and thermal cutting | | | | | | | | |

**Regulations based on the Working Hours Act:** Regulations on notes on on-call time, overtime and overtime
**Regulations based on the Environmental Code:** The regulations on contained use of genetically modified microorganisms.
In addition, to some extent the regulations on pesticides are also issued with authorizations based on the Environmental Code

**Figure 2.2:** Rule Structure of Work Environment regulations [6]. This figure have been approved to use and translate by the Swedish Work Environment Authority.

## 2.2 Definition of education

During this study, the concept of education was in focus. In the first part of the investigation, the legal requirements concerning the HES department were examined to identify different educational demands. The legal requirements within the work environment contained many different types of educational demands, which were formulated in varying ways. This variation made it difficult to discern the type of education that was demanded and needed to be fulfilled.

To be able to conduct the study, a clear definition of education was searched for, to have something to compare the demands in the legal requirements with. The Swedish Work Environment Authority's database was searched, to find a definition of the word education, but no definition was found. *The Swedish Tax Office* (in Swedish: *Skatteverket*) defines education as *'The concept of education must be interpreted in accordance with the concept of teaching in the VAT directive. It includes partly teaching that leads to a degree or to be able to practice a profession, partly teaching that should develop the students' knowledge and skills.'* [7].

Different dictionaries describes the word education in similar ways, as *the act or process of imparting or acquiring general knowledge, developing the powers of reasoning and judgement, and generally of preparing oneself or others intellectually for mature life; the act or process of imparting or acquiring particular knowledge or skills, as for a profession; a degree, level, or kind or schooling; the result produced by instruction, training, or study [...]* [8].

The definitions above are general and difficult to implement in this study, but clearer definitions were difficult to find. To be able to conduct the study, a clearer definition needed to be determined, that was based on these definitions or descriptions. The definition of education that was chosen to be used in this study contains two parts. First, there should exist some sort of available educational material, for example, a PowerPoint presentation. Second, an instruction/specification for the education should be available. The instruction should present information regarding the content of the education, which employees that should participate in it and how the education should be carried out. These two criteria should make sure that the previous definitions were fulfilled in the company's education. This means, for example, that the presentations would provide the employees with knowledge and skills needed for their profession.

## 2.3 Active learning

Active learning is a concept that is defined differently in different studies, but can generally be described as an instructional method that increases students' engagement and involvement in their own learning [9]. This method involves substantial learning activities, that are introduced in the classroom, that make the students reflect about their own actions. Active learning is based on critique of the traditional teaching-centered instructions because of its consequence of students' decreasing motivation and engagement [10]. The active learning aims to provide the students with more motivation, activity and engagement in the classroom and in their own learning [9] [10].

The article *Active learning increases student performance in science, engineering, and mathematics* by S. Freeman, S. L. Eddy and M. McDonough (2014) presents a working definition of active learning as *'Active learning engages students in the process of learning through activities and/or discussion in class, as opposed to passively listening to an expert. It emphasizes higher-order thinking and often involves group work.'* [11]. This definition corresponds with the previously provided definitions above.

Both of these definitions describe active learning as a method that could only be used in the classroom. The interpretation made in this study is that the method's area of use could be much broader than just the classroom. Education in organizations or companies could, for example, use the method within the employees daily work, where they could get provided with an exercise during the class that they should execute during their own work duties. This means, that it is possible to implement teaching in practice in other ways within the working life, and not only in the classroom.

Furthermore, Freeman et al. present a study that compared traditional lecturing and classes that contained active learning [11]. The results of the study presents a difference in students performance on examinations, where the classes with active learning improved their average examination scores significantly by about 6 %. It also showed that students in classes with traditional lecturing were 1.5 times more likely to fail the class, than students in classes that contained active learning. The study concludes classes with active learning as preferred, instead of traditional lectured classes.

Most of the studies about active learning focus on the use of the methods in school education. Nevertheless, the hope is that the method can also be useful in the working life, in education carried out by employees. As for students, employees will also have the same need of engagement and motivation for their learning to increase. Group exercises, for example, may also be meaningful for building relationships between employees and may therefore improve collaborations between them.

# 3

# Methods

The following chapter describes the analytical framework created for the execution of this investigation. The analytical framework is divided into the investigation of compliance with the legal requirements and the investigation of the use of active learning in the internal education. The research employed different methods, such as document analysis, literature reviews, interviews in different forms and surveys.

## 3.1 Investigation of compliance with legal requirements

An overview of the analytical framework used for the investigation of compliance with legal requirements, that was executed in three main steps, is presented in *Figure 3.1*. The analytical framework is further explained in the following sections, *Section 3.1.1-3.1.3*.

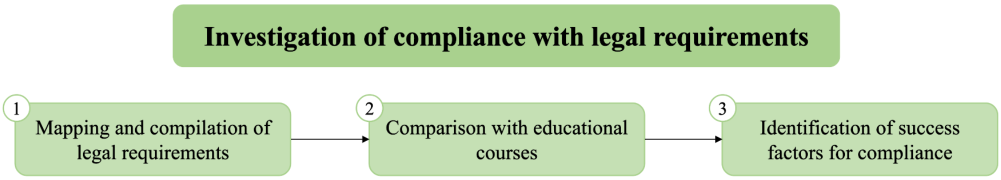



**Figure 3.1:** Overview of analytical framework for the first part of the investigation, the investigation of compliance with legal requirements.

### 3.1.1 Mapping and compilation of legal requirements

The first step of the investigation, that was called *Mapping and compilation of legal requirements*, contained in turn three steps. These steps included a search for legal requirements to investigate and to determine which of these requirements that concerned the specific company. When the requirements were identified, they were further examined to identify potential educational demands in the requirements. These steps are further presented in *Figure 3.2*:

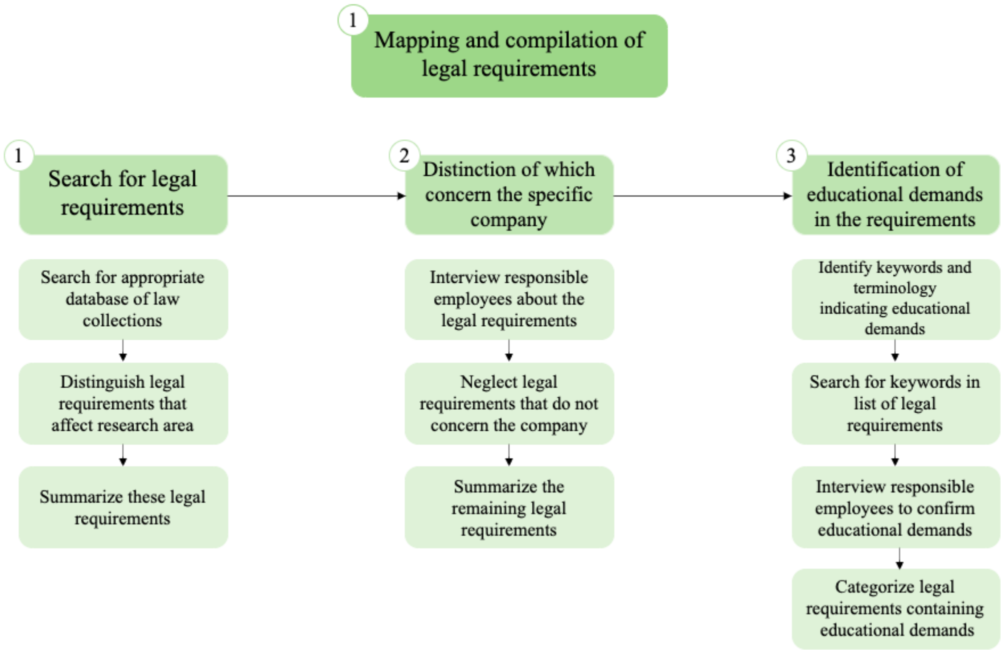



**Figure 3.2:** Analytical framework for the first step of the investigation of compliance with legal requirements - *Mapping and compilation of legal requirements.*

In the search for legal requirements to examine, an appropriate database needed to be found that contained legal requirements. INEOS Inovyn uses a database called *Notisum*, where the HES department has all of their connecting legal requirements compiled. Notisum is a database that provides, for example, companies and authorities with direct links to laws and regulations, and provides them with current updates or changes [13]. This database was therefore the one used in this investigation for examination of the legal requirements.

In Notisum, a list of all requirements associated with the HES department was already compiled for INEOS Inovyn by the database. These were also sorted by the HES managers based on whether they belonged to *Environment*, *Work Environment*, *Human Resources* or *Process Security*. From this, all HES associated legal requirements were, in this study, compiled in a list and thereafter, the employees responsible for the legal requirements were informally interviewed. This was performed in order to identify which of the requirements that concerned the company, and remove the ones that did not.

After the interviews were conducted, the remaining legal requirements that concerned the company were compiled. All legal requirements in the different categories were then read through and the ones that somehow referred to an educational demand were marked and written down in a new list. The ways that the legal requirements had formulated the educational demands were also noted in the list. The list was structured with the same categories as in Notisum. Different words or references that could indicate a demand for education were, for example:

- *Education*
- *Knowledge*
- *Competence*
- *Qualification*
- *Certification*
- *Information*

To confirm the interpretation of the educational demands in the legal requirements, informal interviews were once more conducted with the responsible employees. All requirements that contained a reference to an educational demand was discussed to confirm the interpretations. When the educational demands were confirmed, the list of legal requirements was further categorized. The requirements in the list were color-coded based on whether they contained an explicit or a potential educational demand, where orange implicated an explicit educational demand and yellow a potential educational demand. Whether the educational demands were seen as explicit or potential depended on the terminology in the legal requirement. For example, if the requirement referred to an education with a subsequent qualification, then the educational demand was interpreted as explicit.

The requirements marked with orange or yellow were then sorted in another list, based on terms or wording used to describe the educational demand. In this list, keywords were identified for the reader to be able to understand that there existed an educational demand. Furthermore, a few of the requirements with a potential educational demand were unclear about what educational courses was needed. To understand the demands in these laws, responsible employees were once again informally interviewed, for example the company's *Manager for the Inspection Department*, *Infrastructure Manager*, *Energy Mapper* and *Port Manager*. By doing this research, a clearer view of the educational demand were provided.

### 3.1.2 Comparison with educational courses

From the compiled lists of legal requirements, a comparison with INEOS Inovyn's internal education was executed. The comparison was conducted by first determining a clear definition of education to use in the study. Then, a search was conducted to find available educational courses at the company. When the courses were found, the comparison between them and the demands in the legal requirements could be executed. These steps are further described in *Figure 3.3*:

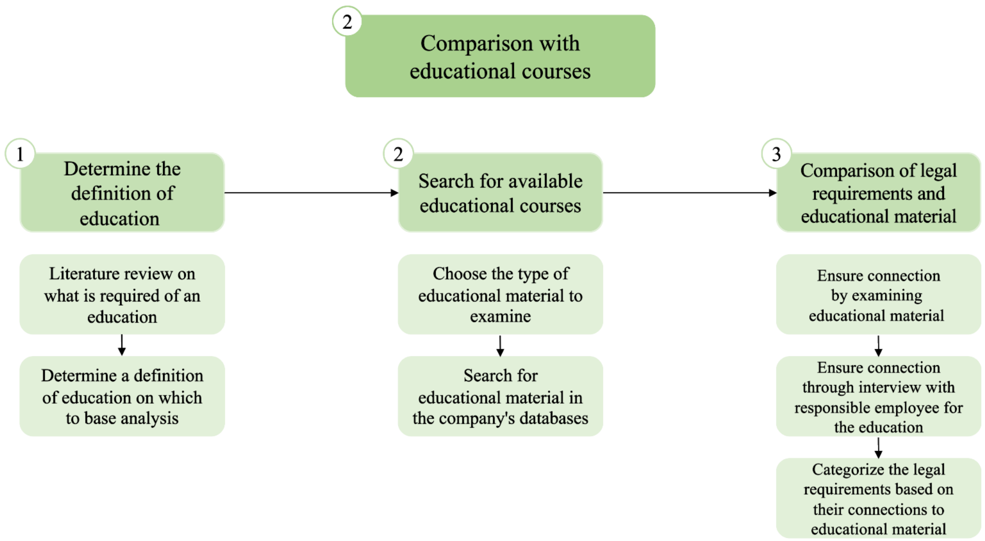



**Figure 3.3:** Analytical framework for the second step of the investigation of compliance with legal requirements - *Comparison with educational courses*.

In the first step, the definition of education needed to be determined. The reason for this determination was to understand the demands in the legal requirements further, to be able to compare the demands to the educational material at the company. Without a clear definition, it would have been difficult to determine if the educational material complied with the educational demands in the legal requirements. To do this, a small literature review was conducted to find and chose a proper definition to base the investigation on. Different databases were searched to find trustworthy sources with a relevant definition of education, see Section *2.2 Definition of education*.

Secondly, INEOS Inovyn's educational material needed to be found. The type of educational material to examine was chosen to be the company's existing documents containing information regarding educational courses. The company's different databases were thoroughly searched, both in the company's intranet, called *IMS*, and their *Microsoft SharePoint*, where they store most of their documents. There were folders named *Education*, where all educational material was contained. Most of the material was either in the form of instructions for education in Word-documents, or as PowerPoint presentations for lectures.

After the document search, a comparison between the educational demands in the legal requirements and the available educational material at the company could be executed. The educational material was thoroughly examined in order to identify connections to one or a few legal requirements. The educational documents that contained a clear reference to a legal requirement could distinctly be connected to the requirement. This reference was often mentioned in the instructional document that belonged to the education, which contained a box named *Demand from (for example: law, owner, company)*, where specific legal requirements should written down, if the education was made to comply with a legal demand.

The documents that did not contain these references, demanded a further examination to confirm any connections to the requirements. When an educational course was found that could possibly be connected to one of the legal requirements, an interpretation of the requirement's educational demand was made to compare with the content of the course. By doing this interpretation and comparison, gaps or absences in the courses based on the legal requirements could be found.

In some cases, it was not clear if the available courses would fulfill the legal requirements fully. Then, an even deeper investigation was needed to determine the fulfillment. This was done by informal interviews of the employees responsible for the different educational courses in question. The interviews were conducted by simply asking the employee responsible for the specific course, to confirm or deny a connection to a legal requirement. By doing the interviews, a clearer view on the compliance of the legal requirements could be determined.

### 3.1.3 Identification of success factors for compliance with the legal requirements

After the comparison, an investigation was conducted to identify which aspects of the legal requirements were the most favourable for the compliance of the requirements. These aspects were in this study called *success factors*. The success factors could both depend on the legal requirements construction and the containing text, and incentives within the company, which drives the compliance. The identification of the success factors was conducted by first examining the text in the legal requirements, and then the company's incentives. The found success factors could then be summarized. These steps are presented in *Figure 3.4*:

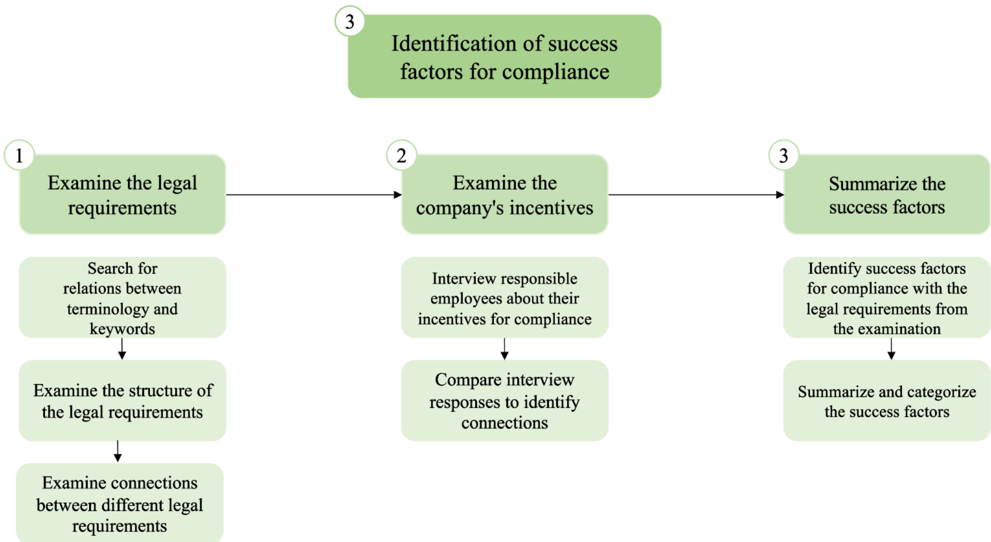



**Figure 3.4:** Analytical framework for the third step of the investigation of compliance with legal requirements - *Identification of success factors for compliance.*

The first step of identifying the success factors consisted of examining the lists of legal requirements. The success factors could, for example, be the previously presented words or terminologies used in the legal requirements, which made them easier or harder to comply with. This could be, for example, due to an increased clarity of the educational demand. In the search for success factors, the legal requirements with educational demands that did not have an belonging educational course, where investigated to determine the reason for the lack of compliance. Similarly, the legal requirements with a distinct connecting education with purpose to comply with the requirement, were investigated to understand the reason for the compliance.

The success factors for compliance of the legal requirements could also be based on the company's own incentives or driving forces, that made them comply more with some requirements than others. To identify these types of success factors, informal interviews were conducted once again with the employees responsible for the legal requirements. They were asked to explain the reasons for why some of the legal requirements were complied with and why some were not. From this, the interview responses was compared, to identify similar incentives for compliance.

Lastly, the two types of success factors were summarized based on the two previous steps. Two different categories of success factors were created: one about the text and terminology in the legal requirements, and one about perceived importance within the company.

## 3.2 Investigation of active learning in internal education

In the second part of the investigation, the company's internal educational courses were analyzed deeper and elements of active learning were identified. An overview of the analytical framework used for the investigation of active learning, divided into three main steps, in the internal education is presented in *Figure 3.5* and is further explained in the following sections, *Section 3.2.1-3.2.3*.

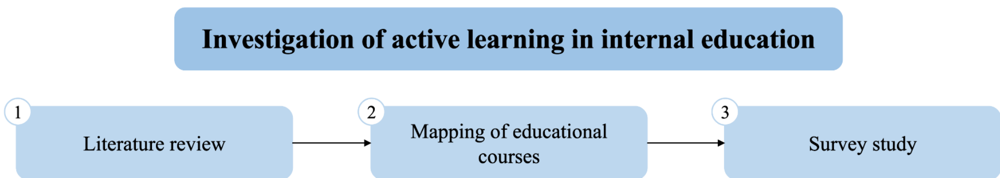



**Figure 3.5:** Overview of analytical framework for the second part of the investigation, the investigation of active learning in internal education.

### 3.2.1 Literature review

To be able to conduct the identification of active elements in the internal educational courses, and choose which elements to base the investigation on, a literature review about active learning had to be executed. The execution consisted of a search for sources to base the investigation on and these sources were then examined to identify different active elements used in the studies. Some of the identified active elements were then chosen to base the investigation on. The literature review was done in order to gain a proper definition of these elements. The literature review is further described in *Figure 3.6*:

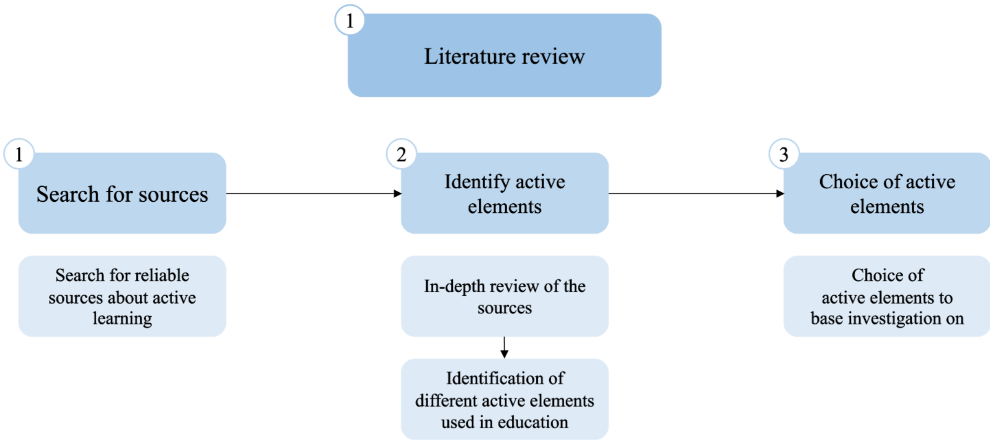



**Figure 3.6:** Analytical framework for the first step of the investigation of active learning in internal education - *Literature review*.

The first step consisted of a search for sources to use in the literature review. The search for reliable and relevant studies was conducted in both *Google-Scholar* and *Chalmers Library*. When these sources where chosen, the identification of active elements could begin.

The studies were thoroughly read through to find which active elements were most effective to use in education, for an increased learning. These elements were both chosen to investigate further, to be able to identify them in the company's educational courses, and also to provide the company with suggestions for effective active elements to use in their education.

### 3.2.2 Mapping of educational courses

The following step of the method was to conduct a mapping of the company's internal education, based on the literature review. The mapping consisted of a search for the company's educational material and in the found material, identify active elements used in the education. All of the active elements were then summarized. These steps are presented in *Figure 3.7*:

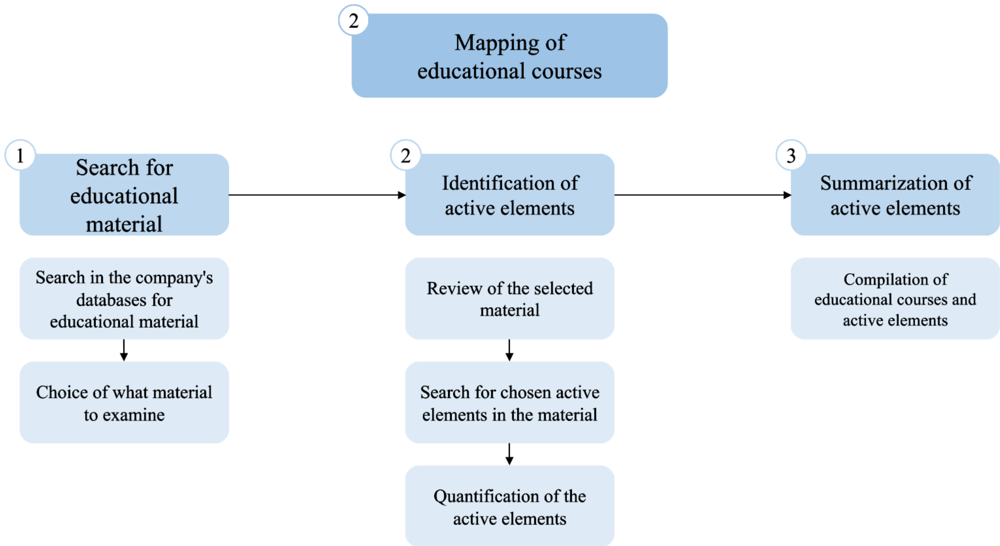



**Figure 3.7:** Analytical framework for the second step of the investigation of active learning in internal education - *Mapping of educational courses*.

The mapping was conducted by searching INEOS Inovyn's SharePoint and their other databases, to find education documents and summarize the educational courses. The material chosen to examine was both instructions for educational courses in documents, and educational presentations. This was done similarly as in the first stage of the investigation.

Then, all documents and presentations were read through and examined thoroughly to identify active elements, based on the definition of active elements in the literature study. The found elements will be presented in *Section 4.2.2*.

Furthermore, the quantity of the identified elements were noted and also the type of elements that were identified, in order to provide an overview of the usage or the absence of active learning. Lastly, a compilation of educational courses and active elements was conducted.

### 3.2.3 Survey study

The finishing step of the investigation consisted of a survey, in order to collect the course participants' point of view of the function and relevance of the company's courses. The survey study contained the following steps; the construction and implementation of the survey, an analysis of the survey responses and lastly, a focus group meeting with the lecturers. These steps are further described in *Figure 3.8* and in the following sections, *Sections 3.2.3.1-3.2.3.4*:

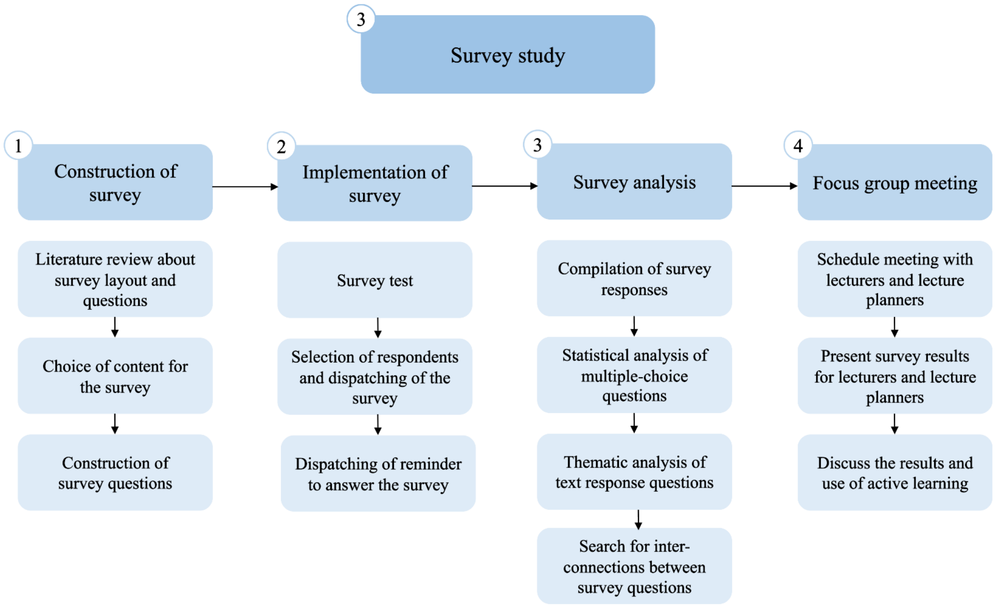



**Figure 3.8:** Analytical framework for the third step of the investigation of active learning in internal education - *Survey study.*

#### 3.2.3.1 Construction of survey

The construction of the survey was divided into two parts; *Construction of survey questions* and *Choice of content for the survey*. These parts are further described below.

**Construction of survey questions**

The construction of the survey was based on the book Metodpraktikan (2017) of Esaisson et al. [14], with advice on, for example, how to formulate questions and answer options. Esaisson et al. (2017) write about the importance of an aesthetically appealing survey that is both professional and simple [14]. That means, a serious and important looking survey that is understandable, and easy and quick to answer. A rule of thumb for web surveys can be to assume that it should take about 10 minutes to answer the survey, so that the participants have the time and energy to complete it.

There should be clear instructions on how to answer the different types of questions and distinct difference between the answer alternatives. The order of the questions should be systematic and well thought out. The answer alternatives for a web survey are usually a number between 2 and 11, and it is often preferable to provide a middle option for participants that do not have an opinion. Esaisson et al. (2017) also mentions that leading questions should be avoided. Open questions can be used, but these are often harder to interpret. It is also important to use well thought out questions, so that no unnecessary questions are asked.

Another aspect is to use comprehensible questions that are based on the following checklist [14]:

- Avoid overly complicated topics
- Avoid difficult words
- Avoid vague words as much as possible
- Make questions as short as possible - without making them unclear
- Ask about one thing at the time
- Avoid negations

From this advice, the survey was created. In order to create well thought out questions, the courses that the questions were based on needed to be well-chosen. To choose these courses, a few aspects were considered. First, to use recent courses so the participants would have good memory of them and to make the survey seem relevant. Second, to use both courses that contain and do not contain active elements, to be able to compare them. Lastly, to only use courses that are applicable to all participants, so that the participants recognize them and can answer every question.

To follow the advice about simple and understandable questions, the language and formulations of the questions were written non-academic and clearly. The survey was written in Swedish, because of the Swedish nationalities of the respondents, and later translated to English when transferred to the report. The survey was made anonymous to provide as honest answers as possible.

All questions in the survey is presented in Appendix A.1. In the questions 1 and 2, the participants were provided a few alternatives to choose from and in the questions 3-4, 6-7 and 9 the participants should write their answer. In question 5, the participants were given a scale from 1 to 10 to assess the different lectures, based on their experience. Lastly, in question 8, the participants should select the options that most fit their wishes.

#### Choice of content for the survey

The courses chosen to investigate in the survey were the following:

- *Company information/economy*
- *PVC Market and recycling*
- *Project Group*
- *IT Cyber Security*
- *Process Security*
- *Chemical Health Hazards*
- *Communication and INEOS Brand Refresh*

These courses, from the *Team meeting for working groups 2023*, were chosen because they were performed recently, and therefore would be fresh in the mind of the participants. The included courses both contained and did not contain active elements, which made them interesting to compare. Many employees attended the courses, which meant that there were many possible respondents for the survey.

A team meeting for working groups is held once a year, for all employees at INEOS Inovyn. One of the purposes of the courses is to provide all employees, with different work roles, the same information about the company. The information regards general information and news about the company, that is relevant for all employees to be aware of. The team meeting also contain information about HES, because of its importance for all employees and the whole company. The lectures might be conducted with the aim of compliance of some of the legal requirements. Another purpose is to raise awareness about other work roles in the company, to improve the understanding between different departments and the meaningfulness of work tasks.

#### 3.2.3.2 Implementation of survey

Before sending out the survey, two employees were asked to answer the survey. This was done to ensure the clarity and relevance of the questions. A few improvement suggestions emerged, which were implemented before the survey was sent out. The survey was then sent to managers and supervisors in maintenance, production, administration, logistics and laboratory, and these were asked to forward the survey to their working groups that participated in the team meeting. The participants were given two weeks to answer the survey. After one week, a reminder was sent out to achieve a higher answer frequency.

#### 3.2.3.3 Survey analysis

After collecting survey answers, a compilation of the responses were made. Thereafter, an analysis of the answers was conducted. The program where the survey was conducted, *Google Forms*, automatically created diagrams for the questions which consisted of alternatives or scales to grade. For the questions with text answers, the analyses had to be executed manually. This was done through a *thematic analysis*.

Braun and Clarkes thematic analysis model (2006) is used to analyze, identify and report different themes or patterns in collected data [15]. The model is particularly useful for explaining qualitative data in an organized and detailed way, but lacks a specific method for application of the model. The thematic analysis is not based on a previous theoretical framework, but instead based on participants' experiences and realities, based on their answers.

The identification of themes in the thematic analysis should be based on the investigation's research questions [15]. During the identification, the frequency of how often the theme occur in the data affect the theme's relevance, and the significance of the theme also depends on how well it captures significant information related to the research questions. In this investigation, the thematic analysis was applied by examining the answers individually to identify themes of answers, for the different questions. The answers then got divided into the categories or themes, to be able to compare them and distinguish frequencies and proportions.

The created themes were based on the definition of active learning that was presented in section *2.3 Active learning*. The definition described active learning as a learning method that aims to increase students' or course participants' motivation, activity and engagement. The themes were therefore based on reasons behind why the different lectures and parts of the lectures, felt engaging or useful for the participants. The basing was done in order to identify active elements, and also factors behind the effectiveness of the active learning. The factors could be, for example, specific reasons for the gained interest for different topics in the lectures, such as connections to the daily work, that often can provide feelings of motivation. The thematic analysis was also executed in order to be able to compare answers in different questions. For example, to investigate if there would be a connection between in which department the participants worked and their perception about how well the lectures met their expectations.

During the analysis, it had to be considered that not only the method of active learning is what makes education effective or interesting. Other aspects that make the learning efficient could be, for example, previous interests in the subjects or adjacent knowledge. From this insight, the questions were based on the identified active elements, to be able to connect the answers to the use of active learning. To capture the use of active learning, the questions were based on how useful the learning felt for the respondents, the first questions were based on their expectations of the lectures. The following questions were based on why the respondents thought one or some of the lectures were more rewarding, and how they could improve. Based on these questions, themes could be identified that were connected to the research questions.

#### 3.2.3.4 Focus group

Based on the survey responses, a meeting with the involved lecturers in the *Team meeting for working groups 2023* was planned. First, the meeting was planned when most of the concerned lecturers could participate. The meeting was planned to be an informal interview or conversation with all the lecturers and planners, or in other words, a *focus group*. The aim of the focus group was to gain an understanding of the lecturers own thoughts about the lectures, and to understand their previous knowledge about the concept of active learning. This was also planned in order to provide the lectures with the respondents insights and inputs from the survey, to improve upcoming team meetings or education.

From these purposes, the conversation with the lecturers consisted of two parts. First, to present the survey responses and results from the analysis. Second, to provide them with information regarding active learning and gain their thoughts about the learning method and how it could be used in their education.

# 4

# Results

The results produced from the investigations can be found in the following sections, where *Section 4.1* consists of the results from the investigation of compliance with the legal requirements, and *Section 4.2* consists of the results from the investigation of active learning in internal education.

## 4.1 Investigation of compliance with legal requirements

In this section, the results from the study of the legal requirements will be presented. First, tables of the legal requirements with a distinct or potential educational demand are presented, followed by a comparison with INEOS Inovyn's current education. Lastly, success factors for following the legal requirements are presented.

### 4.1.1 Mapping and compilation of legal requirements

Several of the legal requirements collected in Notisum contained a form of educational demand, some more distinct than others. The following tables, *Table 1 and 2*, contain the found requirements, based on if the educational demand was explicit or potential. The requirements are categorized based on if they belong to Work Environment, Environment or Process Security. Observe that the requirements in the tables are shortened, the full names can be found in *Appendix A.2*.

**Table 1. Legal requirements with explicit educational demand**

| Legal requirements | | |
|---|---|---|
| **Work Environment** | **Environment** | **Process Security** |
| The Swedish Work Environment Authority's regulations on the use of forklifts | Regulation of the European Parliament and of the Council on registration, evaluation, approval and restriction of chemicals (REACH) | The authority for social protection and preparedness's regulations on cleaning (sweeping) and fire safety control |

| Continuation of Table 1 | | |
|---|---|---|
| **Work Environment** | **Environment** | **Process Security** |
| The Swedish Work Environment Authority's regulations on synthetic inorganic fibres | Proclamation with regulations on control of water at accredited laboratories | |
| The Swedish Work Environment Authority's regulations on artificial optical radiation | Ordinance on fluorinated greenhouse gases | |
| The Swedish Work Environment Authority's regulations on noise | Electrical safety law | |
| The Swedish Work Environment Authority's regulations on vibrations | Ordinance on pesticides | |
| The Swedish Work Environment Authority's regulations on chemical work environment risks | Regulation of the European Parliament on greenhouse gases | |
| The Swedish Board of Occupational Safety and Health's regulations on first aid and emergency support | The Commission's implementation regulation on surveillance and reporting of greenhouse gas emissions in accordance with Directive of the European Parliament and of the Council | |

| Continuation of Table 1 | | |
|---|---|---|
| **Work Environment** | **Environment** | **Process Security** |
| The Swedish Board of Occupational Safety and Health's regulations on solitary work | The Commission's delegated regulation of establishing common security methods for requirements on security governance systems in accordance with the European Parliament and Council Directive | |
| The Swedish Board of Occupational Safety and Health's regulations on building and construction work | The Railway Safety Ordinance | |
| The Swedish Work Environment Authority's regulations and general advice on electro-magnetic fields | The authority for social protection and preparedness's regulations about safety advisers for the transport of dangerous goods (on road and in terrain | |
| The Swedish Work Environment Authority's regulations and general advice on the risk of infection | The Railway Technology Law and Ordinance | |

**Table 2. Legal requirements with potential educational demand**

| **Legal requirements** | | |
|---|---|---|
| **Work Environment** | **Environment** | **Process Security** |
| The Swedish Work Environment Authority's regulations on the use of lifting devices and lifting gear | The Environmental Code 2 Chapter 2§ | Law about flammable and explosive goods |
| The Swedish Work Environment Authority's regulations on the use of work equipment | The Environmental Code 12 Chapter 1b§ | |
| The Swedish Work Environment Authority's regulations on inspection of lifting devices and certain other technical devices | The Swedish Environmental Protection Agency's general advice on self-control | |
| The Swedish Work Environment Authority's regulations and general advice on load ergonomics | Law and ordinance about harbor security | |
| The Swedish Work Environment Agency's regulations on the use of personal protective equipment | The Railway Safety Law | |
| The Swedish Work Environment Authority's regulations and general advice on use and control of pressurized equipment | The Railway Market Law and Ordinance | |
| The Swedish Work Environment Authority's regulations on work in explosive environments | National Railway System Law | |

| Continuation of Table 2 | | |
|---|---|---|
| **Work Environment** | **Environment** | **Process Security** |
| The Occupational Safety and Health Board's regulations on pesticides | Ordinance on energy mapping in large companies | |
| The Occupational Safety and Health Board's regulations on gases | | |
| The Occupational Safety and Health Board's regulations on lead batteries for propulsion of vehicles | | |
| The Swedish Work Environment Authority's regulations and general advice on organizational and social work environment | | |
| The Swedish Work Environment Authority's regulations on systematic work environment | | |
| The Occupational Safety and Health Board's regulations on fusion welding and thermal cutting | | |
| The Swedish Work Environment Authority's regulations on testing with overpressure and suppression | | |

### 4.1.2 Comparison with educational courses

When the lists of legal requirements that contained an educational demand had been completed, they were compared to INEOS Inovyn's educational courses and instructions. Some of the legal requirements had associated educational courses available at the company, these were mostly performed by external personnel. The remaining legal requirements were more challenging to associate to educational courses that belonged to the company. Thus, conversations or informal interviews with responsible employees and supervisors were needed to confirm the connection.

A few educational courses were missing to fulfill the educational demands in the requirements. Furthermore, some of the legal requirements had some form of connecting or associating education at the company, but not to the extent that was requested in the requirements. These legal requirements could therefore be considered to have a certain lack of education. The legal requirements with complete or certain lack of education can be found in *Table 3* below:

**Table 3. Legal requirements with complete or certain lack of education or instructions**

| **Legal requirements with lack of education** | |
|---|---|
| **Complete lack** | **Certain lack** |
| The Swedish Work Environment Authority's regulations on *noise* and general advice on the application of the regulations | The Swedish Work Environment Authority's regulations on *synthetic inorganic fibres* and general advice on the application of the regulations |
| The Swedish Work Environment Authority's regulations on *vibrations* and general advice on the application of the regulations | The Swedish Work Environment Authority's regulations and general advice on use and control of *pressurized equipment* |
| The Swedish Work Environment Authority's regulations on *work in explosive environments* as well as general advice on the application of the regulations | The Occupational Safety and Health Board's regulations on *building and construction work* as well as general advice on the application of the regulations |
| The Swedish Work Environment Authority's regulations and general advice on the *risk of infection* | The Swedish Board of Occupational Safety and Health's regulations on *solitary work* |
| The Swedish Work Environment Authority's regulations on artificial *optical radiation* | The Swedish Environmental Protection Agency's general advice on *self-control* |

| Continuation of Table 3 | |
|---|---|
| **Complete lack** | **Certain lack** |
| The Swedish Work Environment Authority's regulations and general advice on *load ergonomics*<br>The Occupational Safety and Health Board's regulations on *gases* and the Board's general advice on the application of the regulations<br>Ordinance on *energy mapping* in large companies | |

In the following figures, *Figures 4.1-4.4*, summarized presentations of the comparisons between the educational demands in the legal requirements and existing educational courses at the company can be seen. The comparison is based on the categories *'Lack of education and instructions'*, *'Lack of education, but available instructions'*, *No instructions, but available education'* and *'External education and instructions are available'*. The reason for the choice of word *'External'* depended on that all of the educational courses were in this case created and executed by an external firm that INEOS Inovyn rented to fulfill the educational demands in the different requirements.

The last column, named *'Education/instructions refer to legal requirement'* was based on if there was a reference to the legal requirement in the education or instruction. According to the results, only a few of the existing educational courses or instructions included this reference.

The legal requirements with marks in the categories *'Lack of education and instructions'* and *'Lack of education, but available instructions'*, are the requirements presented in *Table 3*. In *Figure 4.4*, three legal requirements are marked in the column *'Lack of education and instructions'*, but these are not presented in *Table 3*. These requirements are: *The Railway Safety Law*, *The Railway Market Law and Ordinance* and *National Railway System Law*. This is because the person responsible for these legal requirements, the Infrastructure Manager, considered them not in need of education.

From the results presented, it can be seen that 8 of the 46 legal requirements with identified educational demands have a complete lack of education, and 5 have a certain lack.

| Legal requirement | Lack of education and instructions | Lack of education, but available instructions | No instructions, but available education | External education and instructions are available | Education/instructions refer to legal requirement |
|---|---|---|---|---|---|
| The Swedish Work Environment Authority's regulations on the use of forklifts | | | | x | x |
| The Swedish Work Environment Authority's regulations on synthetic inorganic fibres | | x | | | |
| The Swedish Work Environment Authority's regulations on artificial optical radiation | x | | | | |
| The Swedish Work Environment Authority's regulations on noise | x | | | | |
| The Swedish Work Environment Authority's regulations on vibrations | x | | | | |
| The Swedish Work Environment Authority's regulations on chemical work environment risks | | | | x | x |
| The Swedish Board of Occupational Safety and Health's regulations on first aid and emergency support | | | | x | |
| The Swedish Board of Occupational Safety and Health's regulations on solitary work | | x | | | x |
| The Swedish Board of Occupational Safety and Health's regulations on building and construction work | | | x | | |
| The Swedish Work Environment Authority's regulations and general advice on electro-magnetic fields | | | x | | |
| The Swedish Work Environment Authority's regulations and general advice on the risk of infection | x | | | | |

**Figure 4.1:** Comparison of the legal requirements within the Work Environment department and the existing education and instructions.

| | | | | | |
|---|---|---|---|---|---|
| The Swedish Work Environment Authority's regulations on the use of lifting devices and lifting gear | | | | x | x |
| The Swedish Work Environment Authority's regulations on the use of work equipment | | | x | | |
| The Swedish Work Environment Authority's regulations on inspection of lifting devices and certain other technical devices | | | | x | x |
| The Swedish Work Environment Authority's regulations and general advice on load ergonomics | x | | | | |
| The Swedish Work Environment Agency's regulations on the use of personal protective equipment | | | x | | |
| The Swedish Work Environment Authority's regulations on use and control of pressurized equipment | | | | | |
| The Swedish Work Environment Authority's regulations on work in explosive environments | x | | | | |
| The Occupational Safety and Health Board's regulations on pesticides | | | | | |
| The Occupational Safety and Health Board's regulations on gases | x | | | | |
| The Occupational Safety and Health Board's regulations on lead batteries for propulsion of vehicles | | | x | | |
| The Swedish Work Environment Authority's regulations and general advice on organizational and social work environment | | | x | | |
| The Swedish Work Environment Authority's regulations on systematic work environment | | | x | | |
| The Occupational Safety and Health Board's regulations on fusion welding and thermal cutting | | | | | |
| The Swedish Work Environment Authority's regulations on testing with overpressure and suppression | | | x | | |

**Figure 4.2:** Continuation of the comparison of the legal requirements within the Work Environment department and the existing education and instructions.

**Environment**

| Legal requirement | Lack of education and instructions | Lack of education, but instructions are available | No instructions, but available education | External education and instructions are available | Education/instructions refer to legal requirement |
|---|---|---|---|---|---|
| Electrical Safety Law | | | x | | |
| Regulation of the European Parliament and of the Council on registration, evaluation, approval and restriction of chemicals (REACH) | | | | | |
| Proclamation with regulations on control of water at acredited laboratiories | | | | x | |
| The Commission's implementation regulation on surveillance and reporting of greenhouse gas emissions in accordance with directive of the European Parliament and of the Council | | | | x | |
| The Commission's delegated regulation of establishing common security methods for requirements on security governance systems in accordance with the European Parliament and Council Directive | | | | x | |
| The Railway Safety Ordinance | | | x | | |
| The Railway Technology Law and Ordinance | | | x | | |
| The authority for social protection and preparedness's regulations about safety advisers for the transport of dangerous goods (on road and in terrain) | | | | x | |

**Figure 4.3:** Comparison of the legal requirements within the Environment department and the existing education and instructions.

| Legal requirement | Lack of education and instructions | Lack of education, but instructions are available | No instructions, but available education | External education and instructions are available | Education/instructions refer to legal requirement |
|---|---|---|---|---|---|
| The Environmental Code 2 Chapter 2§ | | | x | | |
| The Swedish Environmental Protection Agency's general advice on self-control | | x | | | |
| Law and Ordinance about harbor security | | | x | | x |
| The Railway Safety Law | x | | | | |
| The Railway Market Law and Ordinance | x | | | | |
| National Railway System Law | x | | | | |
| Ordinance on energy mapping in large companies | x | | | | |

**Process Security**

| Legal requirement | Lack of education and instructions | Lack of education, but instructions are available | No instructions, but available education | External education and instructions are available | Education/instructions refer to legal requirement |
|---|---|---|---|---|---|
| The authority for social protection and preparedness's regulations on cleaning (sweeping) and fire safety control | | | x | | |
| Law about flammable and explosive goods | | | | x | x |

**Figure 4.4:** Continuation of the comparison of the legal requirements within the Environment department, and the comparison of the legal requirements withing Process Security department, and the existing education and instructions.

### 4.1.3 Identification of success factors

During the investigation of success factors for compliance of the legal requirements in educational courses, a few factors were identified. The factors are placed in two categories. The first category is based on the terminology and structure of the requirements, and the second category on internal factors within the company. The identified success factors in the legal requirements can be seen in *Table 4*:

**Table 4. Identified success factors that increase the compliance with the legal requirements**

| **Success factors** | |
|---|---|
| **Success factors based on how the text in the legal requirements has been formulated** | **Success factors based on perceived importance due to external or internal drivers** |
| Clear sentences with explicit requirements for education, with use of words such as:<br>• *Education*<br>• *Knowledge*<br>• *Competence*<br>• *Qualification*<br>• *Certification*<br>• *Information* | Requirements implicating high risk factors or major consequences |
| Legal requirements which are divided into different sections | Strongly regulated requirements with, for example, penalty fees |
| Sections requiring education, not that it is only included under comments | Requirements that gain attention in, for example, trade associations or stakeholder associations |
| Similarly constructed requirements, based on use of words and structure | Legal requirements that are brought up in audits |

## 4.2 Investigation of active learning in internal education

Based on the method, the following results in *Section 4.2.1-4.2.3* was produced in the investigation of the active learning in INEOS Inovyn's internal education.

### 4.2.1 Literature review

In this part of the literature review, different reports and studies were examined to identify various kinds of active elements that could be searched for in the internal courses. The earlier part of the literature review presented in the chapter *Theory*, contained instead an explanation of the method and its' importance.

In the study *Does Active Learning Work? A Review of the Research* (2004), the author M. Prince describes different types of active methods to be applied to traditional lectures [9]. For example, the lecturer could pause the lecture to ask the participants to discuss their notes with another participant. This method can be seen as an informal activity, but useful to improve the effectiveness of the lectures. Another active element, presented by M. Prince (2004), is to encourage students or course participants to reflect about what they are learning [9]. This is done in order to provide a deeper understanding of the importance of the learning, and also to engage the participants further in their own learning process.

Furthermore, another method that is classified as active learning is *peer discussion*. Peer discussion is often used in schools when students get to discuss questions with other students. According to the report *Why Peer Discussion Improves Student Performance on In-Class Concept Questions* by M. K. Smith et al. (2009) peer discussions can lead to improved understanding and knowledge [12]. In the report, an investigation was conducted where students first got to answer a question, and later answer the same question after a peer discussion, together with another student. A new but similar question was then answered individually by the students. The investigation showed that the correct answers increased throughout the questions, which demonstrated that the discussion lead to an improved understanding of the topic of the questions [12]. Further, the investigation demonstrated that peer discussion also was beneficial for groups of students where no one could initially answer the question correctly.

In recent years, when more education has been carried out remotely, the *flipped classroom* model has been used more extensively. In this model, the execution of the traditional learning is done in the opposite order. This implies, according to the article *Case Studies and the Flipped Classroom* of C. Freeman Herreid and N. A. Schiller (2013), that the flipped classroom model switches or flippes what is normally done in the classroom and what is normally done at home [16]. For example, that the lecture is prerecorded and listened to at home and the 'homework' is thereafter done in the classroom. The method does not always include recorded lectures, but can also be implemented by having the students/course participants read about the subject or watch videos about it at home before the lesson.

C. Freeman Herreid and N. A. Schiller writes *'Instead of students listening to a lecture on, say, genetics in class and then going home to work on a set of assigned problems, they read material and view videos on genetics before coming to class and then engage in class in active learning using case studies, labs, games, simulations, or experiments. A guiding principle of the flipped classroom is that work typically done as homework (e.g., problem solving, essay writing) is better undertaken in class with the guidance of the instructor. Listening to lecture or watching videos is better accomplished at home.'* [16].

The article presents the following advantages of the flipped classroom model, based on previous studies and the article's authors' own investigation conducted on two hundred case study teachers [16]:

1. Students move at their own pace
2. Doing 'homework' in class gives teachers better insight into student difficulties and learning styles
3. teachers can more easily customize and update the curriculum and provide it to students 24/7
4. Classroom time can be used more effectively and creatively
5. Teachers using the method report seeing increased levels of student achievement, interest, and engagement
6. Learning theory supports the new approaches
7. The use of technology is flexible and appropriate for '21st century learning.'
8. There is more time to spend with students on authentic research
9. Students get more time working with scientific equipment that is only available in the classroom
10. Students who miss class [...] can watch the lectures while on the road
11. The method 'promotes thinking inside and outside of the classroom'
12. Students are more actively involved in the learning process
13. The students really like it

The Swedish School Board (in Swedish; Skolverket) also discuss the flipped classroom model, but mentions both pros and cons that the model provides [17]. The advantages mentioned in the previous article are referred to, but a few cons are also brought up. For example, that the risk of coming unprepared to the class makes the students put more time on the preparations, which can lead to an increased resistance from the students. Another disadvantage can be that more preparatory work is required from the teachers, because the teaching material that the students should have access to before the teaching session must maintain a high quality and be adapted to the target group [17].

### 4.2.2 Mapping of educational courses

In the mapping of educational courses, all educational material was thoroughly read through and active elements were identified. *Table 5* presents the mapping of the educational courses based on the quantity of appearance of active elements in the courses and the types of active elements. The identification of the active elements is based on the previous literature review and are only counted if these are included in writing in the teaching material.

In the table, it can be distinguished that 9 out of the 39 examined courses contained active elements, of the types '*Questions to participants*', '*Discussion exercises*', '*Concluding exercises*', *Scenario exercises*', '*Feedback exercises*' and '*Workshop exercises*'. There were a total of 17 active moments used in the educational courses, as some courses contained more than one active element. *Table 5* also shows the percentage of active elements out of the total number of elements.

**Table 5. Active learning in internal educational courses**

| **Course name** | **Quantity of active elements** | **Type of active elements** |
|---|---|---|
| **Team meeting for working groups 2023** | | |
| Company information/economy | 0 | |
| PC Market and Recycling | 0 | |
| Project Group | 0 | |
| IT Cyber Security | 0 | |
| Process Security | 1 (5.9%) | Question to participants |
| Chemical Health Hazards | 3 (17.6%) | Discussion exercises |
| Communication and INEOS Brand Refresh | 1 (5.9%) | Question to participants |
| **HES education for newly employed** | | |
| Introduction HES and Biovyn Certification | 0 | |
| Process Security | 0 | |

| Continuation of Table 5 | | |
|---|---|---|
| **Course name** | **Quantity of active elements** | **Type of active elements** |
| Work Environment | 3 (17.6%) | Questions to participants |
| An equal workplace | 1 (5.9%) | Concluding exercise |
| Environmental Management System | 0 | |
| Energy Management System | 0 | |
| **Other courses** | | |
| Biovyn Education | 0 | |
| Bricanyl and Pulmicort | 1 (5.9%) | Own investigation |
| HES Summer Employees | 2 (11.8%) | Scenario exercises |
| Inovyn Company Presentation (Movie) | 0 | |
| HES Production Summer Employees | 0 | |
| Introduction Day Summer Employees | 0 | |
| Emergency Drill (Movie) | 0 | |
| Education Work Permit | 0 | |
| Entry into closed areas | 0 | |
| Education Permission Recipient | 0 | |
| Respiratory Protection | 0 | |
| Visitor Recipient | 0 | |
| Fire and Entry Guard | 0 | |

| Continuation of Table 5 | | |
|---|---|---|
| **Course name** | **Quantity of active elements** | **Type of active elements** |
| Facility Security | 0 | |
| ISPS | 0 | |
| Chemical Work Environment Risks | 3 (17.6%) | Discussion exercises |
| INEOS 20 HES Principles | 2 (11.8%) | Feedback and Workshop |
| Difference between LEL and area meter | 0 | |
| Information on the Internal Emergency Plan | 0 | |
| Non Metallic Equipment Inspection | 0 | |
| Plastic Materials | 0 | |
| Training new foreman for the Technical Group | 0 | |
| Arkadin | 0 | |
| Entry Chemistry | 0 | |
| Introduction Trainees | 0 | |
| Education ISPS | 0 | |

### 4.2.3 Survey study

The survey was sent out to all employees at INEOS Inovyn. According to the lists of participants, there were about 245 employees that participated in the *Team Meeting for working groups 2023*. The answer frequency was 74 survey respondents, which is approximately 30% of the participants.

For the questions where the respondents were to answer freely in text, themes were created that all answers were divided into. Some of the answers, that was short or unclear, had to be interpreted to be able to divide the answer to one of the themes. In *Sections 4.2.3.3, 4.2.3.4, 4.2.3.6, 4.2.3.7 and 4.2.3.9*, these questions can be seen, which answers have been divided into themes. Note that the created themes are a compilation of several responses, with the aim of capturing many of the participants' responses in each theme, based on *3.2.3.3 Survey analysis*.

A few answers were removed due to misunderstandings of the questions or the respondents' lack of seriousness. In these cases, the questions with alternatives could still be useful and were therefor included in the results. In the following sections, the summarized answers are presented, some of them based on the identified themes in the answers.

In the last part of this section, some discovered interconnections between the answers to the different questions are presented. The interconnections are meant to describe if some respondents answered similarly to different questions, to find possible connections or differences.

#### 4.2.3.1 Question 1. Department

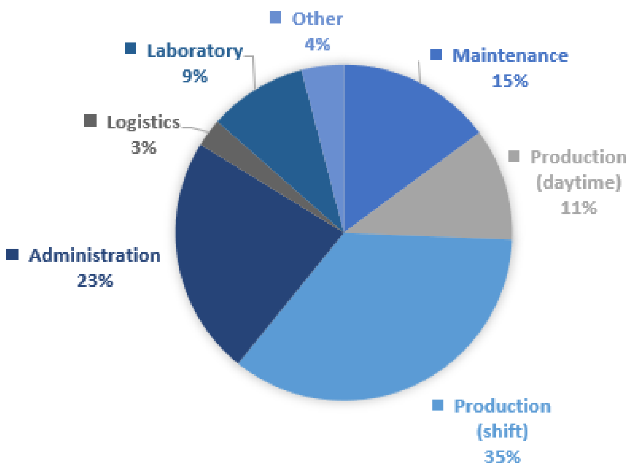



**Figure 4.5:** Answers for *Question 1. In which department at INEOS Inovyn do you work?* in the survey.

As seen in Figure 4.5, most of the respondents worked in production (shift), which was expected as most of the employees work in that department. The answer frequency for the logistics department was relatively low (3%).

#### 4.2.3.2 Question 2. Occasion

In *Figure 4.6* it is seen that most of the survey respondents participated in the meeting that occurred on Thursday 2/3 (25%) and Tuesday 21/3 (24%), but the answer frequency was similar between all alternatives.

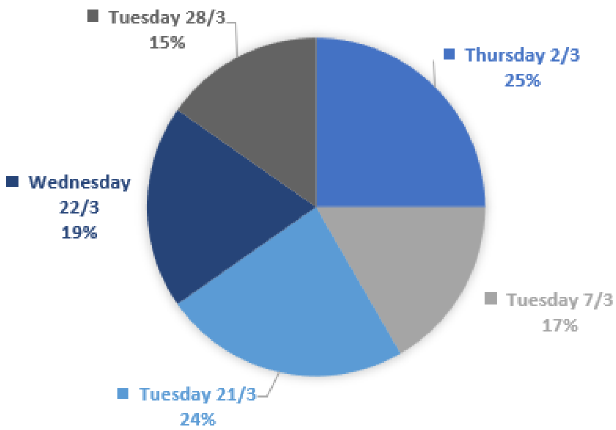



**Figure 4.6:** Answers for *Question 2. On what occasion did you participate in the work meeting?* in the survey.

#### 4.2.3.3 Question 3. Expectations/goals

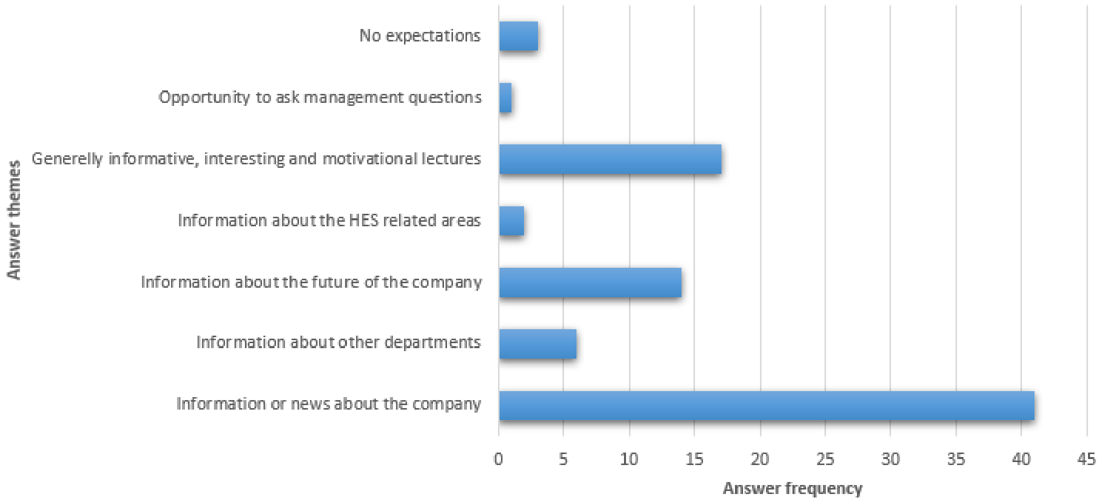



**Figure 4.7:** Answers for *Question 3. What were your expectations/goals with the lectures?* in the survey, with answers divided into identified themes.

In *Figure 4.7*, the answers for Question 3 is presented, based on the following identified themes:

**Theme 1. Information or news about the company**
The participants expectations concerned general and various information and updates about the company's and/or site's well being or progress, or news news that affected the company.

**Theme 2. Information about other departments**
The participants expectations concerned information about departments other than

the one to which the employee belonged.

**Theme 3. Information about the future of the company**
The participants expectations concerned information about the future for the company, such as new projects or investments.

**Theme 4. Information about the HES department**
The participants expectations concerned information specifically related to the HES department and its different areas at the company.

**Theme 5. Generally informative, interesting and motivational lectures**
The participants expectations concerned the lectures in general and had hopes for them to be interesting and motivational, and to get provided with relevant information about several areas in the company.

**Theme 6. Opportunity to ask management questions**
The participants were expecting to have an opportunity to ask the company management questions.

**Theme 7. No expectations**
The participants had no expectations for the lectures.

#### 4.2.3.4 Question 4. Fulfillment of expectations/goals

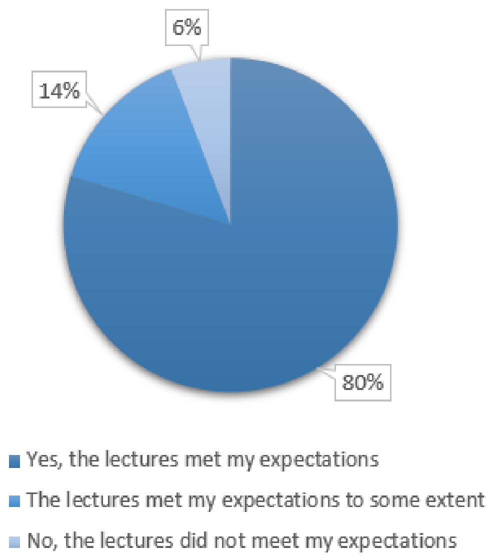



**Figure 4.8:** Answers for *Question 4. Do you consider that your experience of the lectures met your expectations/goals)* in the survey, with anwers divided into identified themes.

The themes identified in the answers for this question, as presented in *Figure 4.8*, was:

1. Yes, the lectures met my expectations

2. The lectures met my expectations to some extent
3. No, the lectures did not meet my expectations

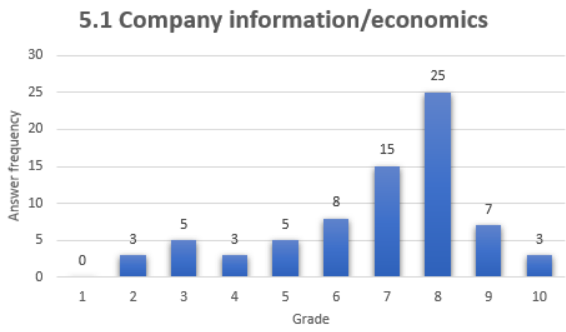
The survey responses shown in the figure presents that 80% of the respondents were satisfied with the lectures based on their previous expectations and 14% answered that the lectures met their expectations to some extent. 6% of the respondents did not consider the lectures met with their previous expectations.

#### 4.2.3.5 Question 5. Perception of lectures

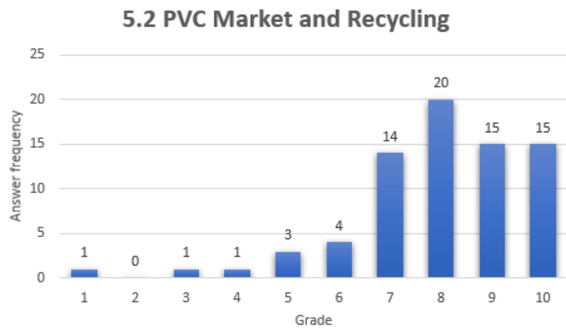
In *Figure 4.9 (a)-(g)*, the summarized answers for Question 5.1-7 are presented. As mentioned earlier in the method chapter, the participants were in these questions asked to grade the lectures between 1-10 based on how rewarding they were perceived. Several lectures were graded similarly, with most answers between the grades 5-8. The average values for the grades for the courses were calculated to approximately:

1. Company information/economics; 6.8
2. PVC Market and Recycling; 7.9
3. Project Group; 7.1
4. IT Cyber Security; 7.0
5. Process Security; 7.2
6. Chemical Health Hazards; 6.8
7. Communication and INEOS Brand Refresh; 6.6

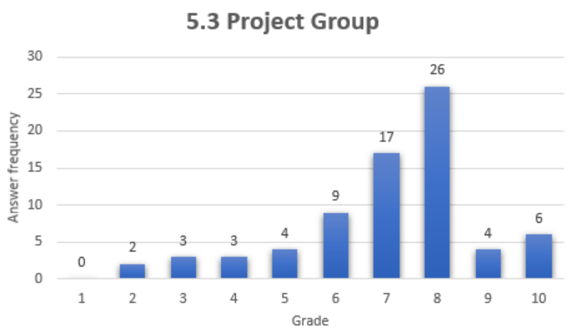
These average values indicates that *PVC Market and Recycling* was the most rewarding lecture, and *Communication and INEOS Brand Refresh* was the least rewarding, according to the respondents.



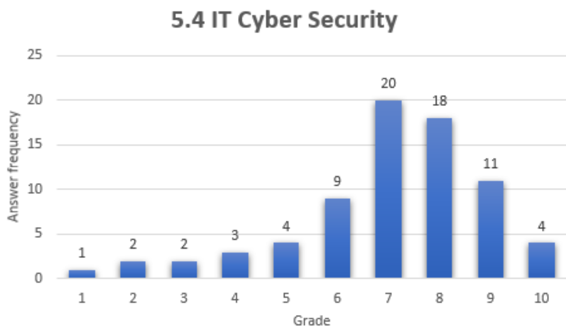

(a) Results for Question 5.1 in the survey



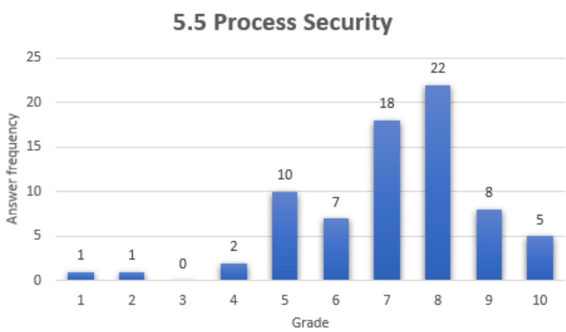

(b) Results for Question 5.2 in the survey



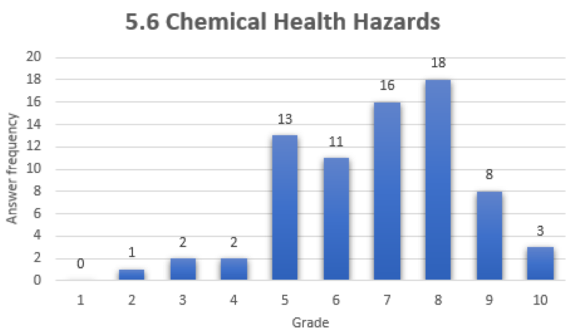

(c) Results for Question 5.3 in the survey



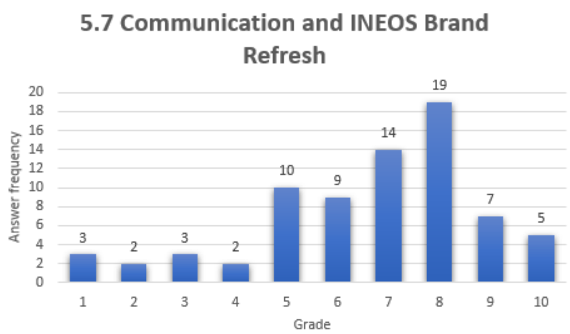

(d) Results for Question 5.4 in the survey




(e) Results for Question 5.5 in the survey




(f) Results for Question 5.6 in the survey




(g) Results for Question 5.7 in the survey

**Figure 4.9:** The summarized responses to Question 5 in the survey, with the grades on the x-axis and answer frequencies on the y-axis.

#### 4.2.3.6 Question 6. Reason for high perception

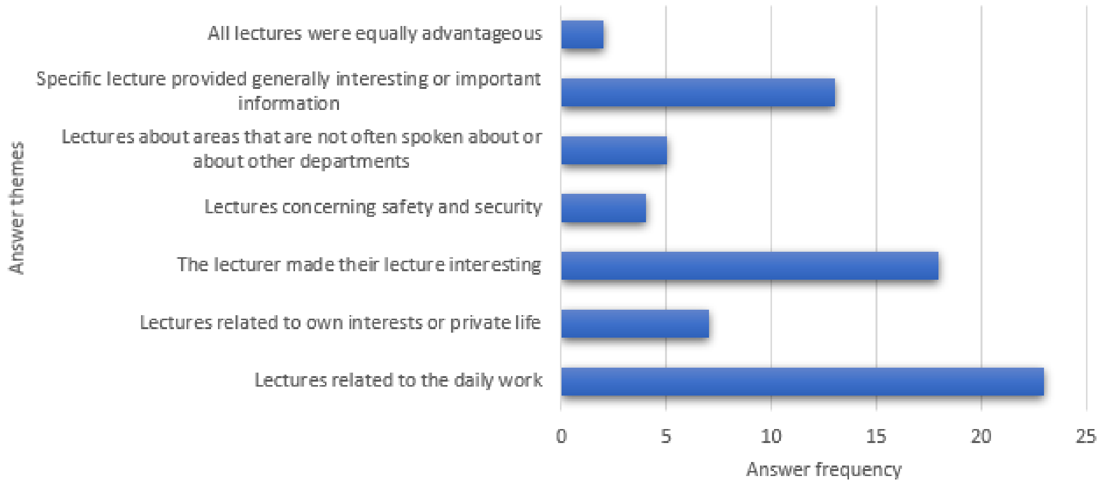



**Figure 4.10:** Answers for *Question 6. For the lectures to which you gave the highest points, describe the reason for the choices.* in the survey, with answers divided into identified themes.

The following categories or themes were created, shown in *Figure 4.10*, for the answers to Question 6:

**Theme 1. Lectures related to the daily work**
The participants thought it was interesting to hear more about the company they work for, which makes the information seem relevant and useful. It was also interesting to hear about the future and what's to come, positive projects or information that can lead to a feeling of excitement and pride.

**Theme 2. Lectures related to own interests or private life**
The participants' own interests about the information made the lectures feel engaging and caught their interests. Information that concerned the whole society or world was also perceived as important, and also about where the company's products are sold and used for.

**Theme 3. The lecturer made their lecture interesting**
The participants thought that the lectures spoke in an engaging way that caught their interests, and/or included the audience. The presentation were well thought through and elaborated.

**Theme 4. Lectures concerning safety and security**
The participants thought that the information about the HES department felt important for the safety and security of the employees and society in general.

**Theme 5. Lectures about areas that are not often spoken about or about other departments**
The participants thought that new information was engaging and motivating, and that they were provided with new perspectives on, for example, why they work the

way they do. Information about other departments provided a greater understanding about the whole company.

**Theme 6. Specific lecture provided generally interesting or important information** This theme captured all responses that were not detailed, but where the participants generally appreciated lectures that provided interesting or important information.

**Theme 7. All lectures were equally advantageous**
The answers sorted in this theme indicated that several lectures were equally rewarding.

#### 4.2.3.7 Question 7. Engaging parts of lectures

In this question, the respondents were meant to describe which parts or elements of the lecture that caught their interest or engaged them. Most of the answers were nevertheless based on the content of the different lectures, and what was the most interesting information according to them. For this reason, two different figures was created, based on differently identified themes.

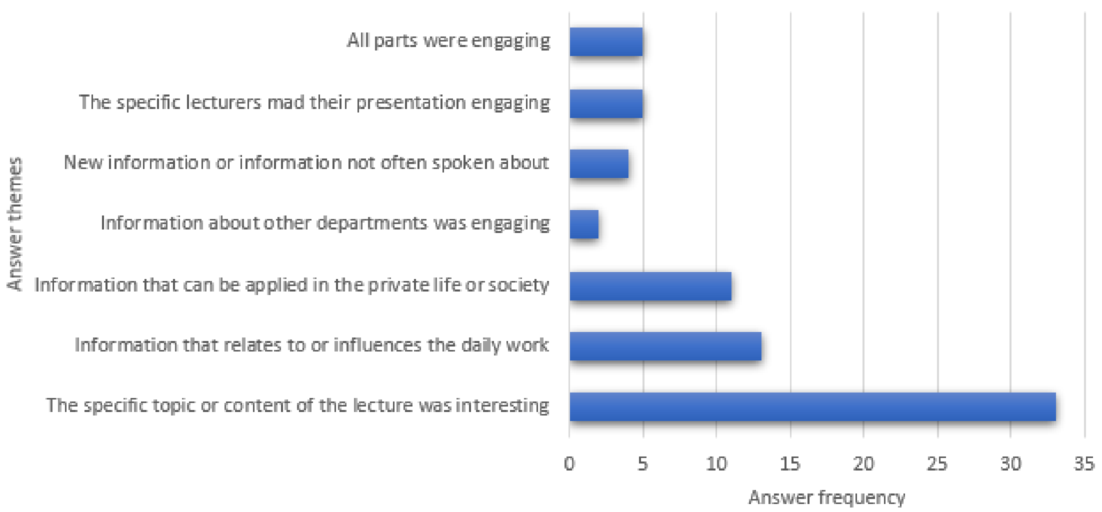



**Figure 4.11:** Answers for *Question 7. Continuation of the previous question. What parts of the lectures engaged you and why?* in the survey, with answers divided into identified themes.

In *Figure 4.11*, the first collection of themes for Question 7 is presented and the themes were identified as following:

**Theme 1. The specific topic or content of the lecture was interesting**
The respondents answers concerned a specific topic or content of one or a few lectures. These topics felt engaging because they were perceived as interesting or important and to further explanation of the engagement was written in the answers. Though, some participants mentioned that information that felt new to them was

specifically interesting.

**Theme 2. Information that relates to or influences the daily work**
This category captured answers concerning information that could be directly or indirectly applied to the daily work. For example, about how their products can be used and the reason behind the importance of their work.

**Theme 3. Information that can be applied in the private life or society**
The answers placed in this theme mentioned the relevance of the information or lectures in their personal lives or in the society.

**Theme 4. Information about other departments was engaging**
The responses placed in this category concerned information regarding other departments than the respondent's own. The engagement regarded the increase of understanding of other departments, to get provided with an overview of the company.

**Theme 5. New information or information not often spoken about**
The answers placed in this theme concerned new information or information not often spoken about as engaging to them.

**Theme 6. The specific lecturers were engaging**
The respondents mentioned a specific lecture, topic or content as engaging.

**Theme 7. All parts were engaging**
The respondents thought all parts of the lectures were engaging.

The first collection of themes were based on a wider view, where the investigation focused on which parts of the lectures were engaging. Therefore, all answers concerning a specific topic or content were placed in the same theme. In *Figure 4.11*, it is shown that the this theme, *The specific topic or content of the lecture was interesting*, had the highest answer frequency. To investigate this matter further, a more detailed analysis of this specific theme was executed and new themes were created.

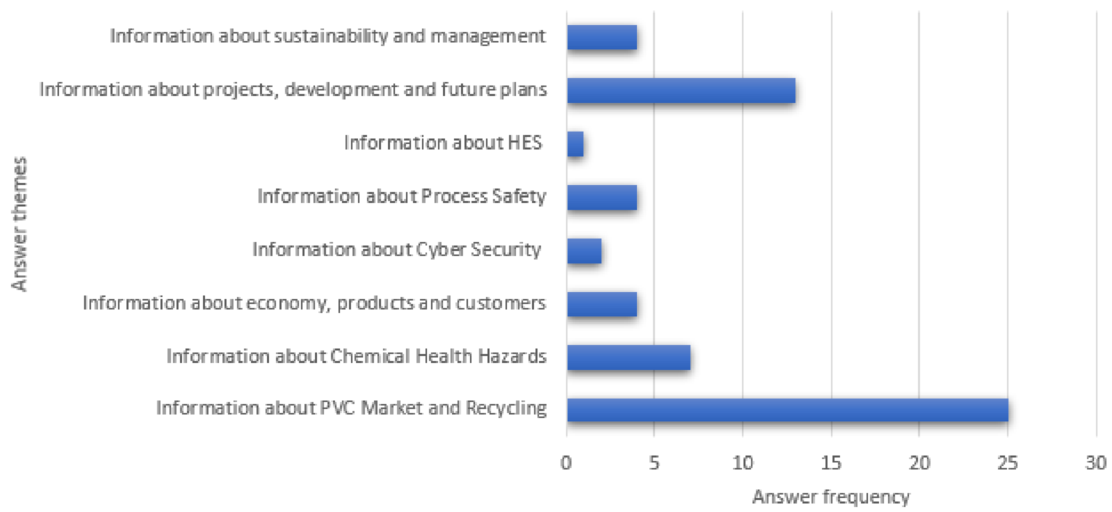



**Figure 4.12:** Answers for *Question 7. Continuation of the previous question. What parts of the lectures engaged you and why?* in the survey, based on what specific content or topic that was the most engaging.

As presented in *Figure 4.12*, the following content or topic that was most engaging, without mutual order, was:

1. Information about PVC Market and Recycling
2. Information about Chemical Health Hazards
3. Information about economy, products and customers
4. Information about Cyber Security
5. Information about Process Safety
6. Information about HES
7. Information about projects, development and future plans
8. Information about sustainability and management

The figure presents that *Information about PVC Market and Recycling* (42%) was most engaging, followed by *Information about projects, development and future plans* (22%).

#### 4.2.3.8 Question 8. Suggestions for making the lectures more rewarding

Based on the answers of Question 8, as seen in *Figure 4.13*, the most frequent request to make the lectures more advantageous was to include more connections to the daily work in the lectures (45%). The remaining answers requested more communication between the lecturer and the participants (19%), more images (14%), more short discussion exercises (11%) or an own other option (22%). 20 respondents (27%) answered that nothing further was needed in the presentations.

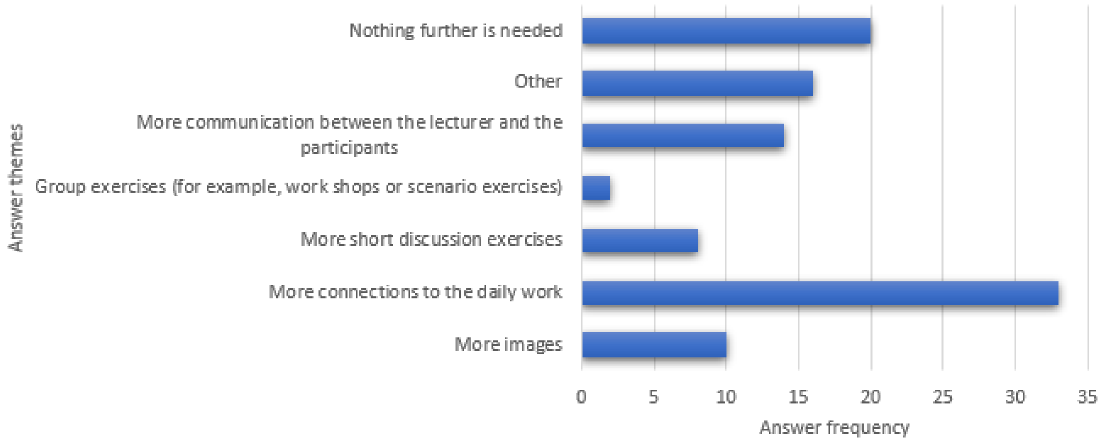



**Figure 4.13:** Answers for *Question 8. Could any of the following optins have made the lectures more rewarding?* in the survey.

#### 4.2.3.9 Question 9. Explanation of own suggestion

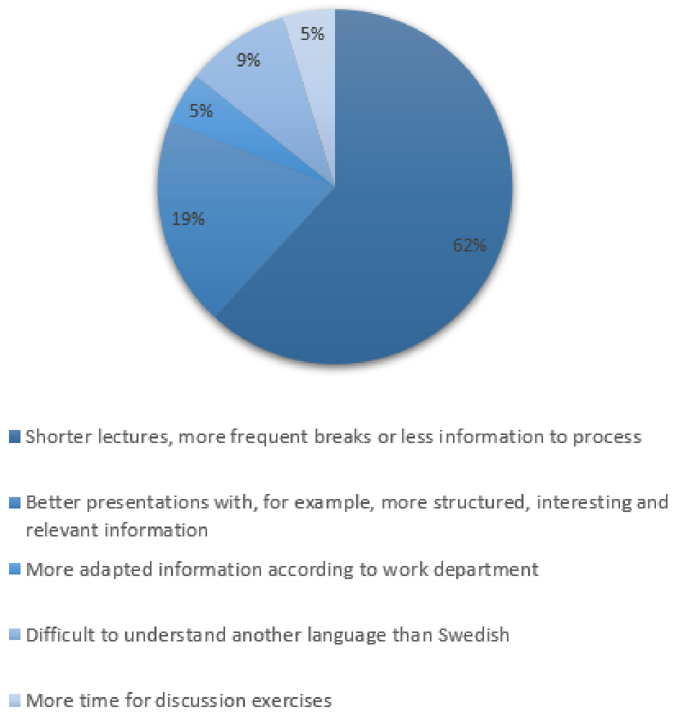



**Figure 4.14:** Answers for *Question 9. If you chose option 'Other' on the previous question, please justify your answers.* in the survey, with the answers divided identified themes.

The identified themes for Question 9, as can be seen in *Figure 4.14* was:

1. Shorter lectures, more frequent breaks or less information to process
2. Better presentations with, for example, more structured, interesting and relevant information

3. More adapted information according to work department
4. Difficult to understand another language than Swedish
5. More time for discussion exercises

This question was not mandatory to answer, and therefore was only answered by 18 respondents. 62% of them answered according to the first theme, with suggestions such as more frequent breaks or shorter lectures to make them more advantageous. 19% of the respondents mentioned that they had wished for presentations of higher quality, and where placed in the second theme. The other answers where placed in the remaining themes, as seen in the figure.

#### 4.2.3.10 Interconnections between survey questions

To begin with, Question 1 and 4 were compared to examine connections between work department and satisfaction of the expectations of the courses. The 10 respondents (14% of all respondents) that answered *'The lectures met my expectations to some extent'*, worked in the departments *Administration* (3 respondents), *Maintenance* (1 respondent), *Production (shift)* (3 respondents), *Production (daytime)* (2 respondents) and *Laboratory* (1 respondent). Compared to the proportion of the departments of all respondents, the highest share of answers belonged to *Production (daytime)*, where 2 out of 8 (25%) answered *'The lectures met my expectations to some extent'*.

Furthermore, 4 respondents (6% of all respondents) answered *'No, the lectures did not meet my expectations'*. These answers belonged to the work departments *Maintenance* (1 respondent), *Production (shift)* (2 respondents) and *Laboratory* (1 respondent). The answers compared to all respondents in each work department, the answer frequency for this alternative was relatively low and lay in between 9 to 14%.

Question 6 about the participants explanation about the perceptions of the lectures, showed that approximately 32% (23 participants) answered according to the theme *Lectures related to the daily work*. Out of these 23 participants, 8 participants answered the next question, Question 7 about engaging parts of lectures, that *The specific topic or content of the lecture was interesting*.

The answers to the remaining questions were also examined and compared, but these comparisons between the answers did not implicate any interconnections.

### 4.2.4 Focus group meeting

During the focus group with the lecturers, five of the seven lecturers were participating. Two of the planners for the team meeting also participated. The lecturers and planners were provided with the results from the survey, to present to them the the respondents' opinions and answers. Between the presented results, discussions were held where the teachers could share their insights or thoughts.

During these discussions, the lecturers and education planners shared that they had not come into contact with the concept of active learning previously. They were aware that discussions were beneficial in education for an increased learning, but not of active learning in general. They shared that only a few of them consciously use active exercises. The education planners also shared that a few participants had requested an evaluation of the team meeting, but that they had not previously implemented one. They were therefor grateful for the evaluation and the recommendations and suggestions for improvement that emerged.

The relatively low answer frequency, which was approximately 30%, was also discussed during the focus group. One of the lecturers believed that this could implicate that the survey responses were not fully representative for all employees who participated in the team meetings. The education planners still thought that, considering the high results of Question 4, as seen in *Figure 4.8*, the participants were satisfied with the team meetings.

One solution for the low answer frequency that was raised, was that the participants could have been provided with an appointed time to answer the survey, in the end of the team meetings. Considering there was already a time limit for the team meeting, and that many participants thought there were too few breaks during the day, the lecturers were hesitant to this solution. If an appointed time would be possible, it would therefore be important that all lecturers kept to their time limit and included less content in their lectures, according to the lecturers.

The few requests from the survey respondents for more discussion or group exercises, as seen in Figure 4.13, were also discussed. This could be due to the large groups at the team meetings, and that employees did not feel comfortable conversing with people they did not already know. However, more homogeneous groups could have resulted in less opportunity for exchange of experiences between the departments. In conclusion, the lecturers and education planners were satisfied with the results of the survey and were given insights to improvements for next years' team meetings.

# 5 Discussion

The following sections, *Sections 5.1 and 5.2*, present an evaluation of the results, based on the theory and method that was used during the investigations of the legal requirements and the internal education. Furthermore, the study's limitations will be presented and discussed in the last section, *Section 5.3*.

## 5.1 Investigation of compliance with legal requirements

From the results in the investigation of the legal requirements, several things were discovered during the mapping, comparison with educational courses and identification of success factors for compliance.

### 5.1.1 Mapping and compilation of legal requirements

In the mapping of the legal requirements, a search for legal requirements was conducted, to examine which requirements affect the research area and the company. Then, an identification of educational demands in the legal requirements was executed and the demands were categorized based on if they were *explicit* or *potential*.

During this mapping step, it was determined that most of the legal requirements containing an educational demand, belonged to the category *Work Environment*, see *Tables 1 and 2*. These legal requirements connect to each other as shown in The Swedish Work Environment Authority's Rule Structure, *Figure 2.2*. As presented in section *2.12 Work environment regulations*, the Work Environmental Act and the Systematic Work Environment regulation (SAM) were defined as *comprehensive requirements* and the remaining requirements were defined as *substantive regulations*. The substantive regulations were then divided further into the definitions *comprehensive substantive regulations* and *belonging substantive regulations*.

All of the substantive regulations belong and connect to the comprehensive requirements, but goes into more detail about different parts of the work environment. The belonging substantive regulations goes into even more detail about a certain area and belongs to an comprehensive substantive regulation. These connections between the work environmental requirements and regulations made the mapping more complicated, because the demands that needed to be complied with could not only be found in the individual regulations, but also in the more comprehensive legal requirements that they belonged to. This meant that a great deal of knowledge was needed to be able to find these connections between the legal requirements, to actually know which educational demands need to be fulfilled. This knowledge was provided through interviews with the responsible employee for these requirements, the *Work Environment Engineer*. These interviews provided insights about which legal requirements were comprehensive and contained demands which other regulations also needed to fulfill.

Furthermore, the formulations of the legal requirements differed greatly. The requirements contained different types of terminology, that could be interpreted in different ways. Some of them requested a specific education that provided a certain certification or qualification, which made their educational demand easier to determine. Others only requested that the employees would be provided with information about the subject, or a certain amount of knowledge. These demands were open for interpretation about how much knowledge or information was needed, and also about which topics the information or knowledge should concern. This difference also made the mapping complicated and if more similar formulations were used in several requirements, it might have simplified the investigation.

It also would have been beneficial if the Swedish Work Environment Authority provided companies and organizations with a clear definition of education. The concept of education can be interpreted differently and can be used to provide employees with knowledge in many different ways, for example, with lectures, written instructions or conversations between colleagues. It would therefore be useful to get provided with a list of the terms education, information and knowledge, to clearly know what the terms mean and how these should be applied within the company so that the legal requirements are complied with correctly.

The legal requirements' openness to interpretation and vague descriptions of which educational requirements were needed, could be due to several reasons. One of the reasons might be that the laws are to be applicable to many different types of companies and organizations, in different sizes. The legal requirements also need to be applicable to specific companies with their different conditions and work areas. At the same time, the possible interpretability makes it difficult for companies to know what is required of them to comply with the requirements, which means that companies can comply with the requirements in many different ways. Therefore, it is difficult to determine what is actually the correct way to pursue it. Great responsibility is therefore placed on the employer, to figure out the correct way to comply with the legal requirements. This applies, for example, to the level at which the courses are to be taken, how extensive they should be and which employees that are in need of the education.

The legal requirements rarely contain any information about the content of the expected educational courses, which may lead to a big difference between courses at different companies. Sometimes, the education mentions, for example, a demand of education and knowledge, or one of them. It can be difficult to determine the difference between the concepts and no further description can be found.

### 5.1.2 Comparison with educational courses

During the comparison with the legal requirements and the educational courses available at the company, a number of factors emerged that made comparisons difficult. The first factor that emerged involved that the company stored their documents in different places in their databases. The reason for this was probably because of changes in the databases, where all transfers of documents have not been completed. It would have been beneficial for the investigation if all legal requirements were available in one place.

The second factor that lead to a difficulty in the comparison, was that only a few of the documents about the educational courses referenced specifically to the legal requirements. The ones that did refer to one or several legal requirements, made the comparison easier. Though, even if they did refer to the legal requirements, it could not completely be ensured that all paragraphs in the legal requirements were complied with. Due to the time limit of the investigation, this factor could not be further examined, and the conclusion had to be drawn that the educational courses that was available was sufficient to comply with the legal requirement.

From the results of the comparison, presented in *Table 3*, it is clear that 13 of the legal requirements containing an educational demand had an absence of this education. Some of them were completely absent of an education and some of them had some sort of education, but not to the extent to which the requirements requested. *Figures 4.1-4.4* showed that several requirements had a connecting educational course at the company, but did not have an instruction for the education or a reference to the legal requirement. Only a few legal requirements had both an educational course and an instruction for the course available.

The issue with not having an instruction for the educational course, is that the educational material does not describe which employees that are provided with the course. It was also in the instructions for the courses that references to the legal requirements appeared, which means that the instructions are important to clearly show that the legal requirements are complied with. This also means that without the instructions, it is more challenging to compare the courses to the legal requirements.

Some of the topics of the legal requirements are not connected to a specific educational course, but can still be mentioned in other courses. This also made ensuring compliance with the law more difficult. It would have been preferable to either have a smaller course for the specific topic, or make the connection between the different topics in the educational courses to the legal requirements more distinct. This also refers back to the use of instructions for the education, to more clearly specify the content of the courses.

The compliance also had to do with the construction of the legal requirements. The more comprehensive the requirement is, the more complicated they are to comply with. During the interviews with the responsible employees, it appeared that some belonging substantive regulations had been removed and instead been added to the comprehensive substantive regulations. For example, the requirements regarding allergenic and carcinogenic substances had been added to the comprehensive substantive regulation *Chemical Health Risks*. The size and comprehensiveness of the requirements, may affect how easy it is to comply with the requirement, as well as to find specific information in it. On the other hand, it may be favourable to collect similar topics in the same regulation. This can be seen as a matter of taste for the responsible employees. Some employees may favor more belonging substantive regulations regarding specific topics, and other a few comprehensive substantive regulations that contain more information and topics.

During the comparison, a few interviews were conducted as previously mentioned. These were both conducted to gain information regarding the compliance of the requirements within the education, but also to confirm that the interpretation made in the investigation corresponded to theirs. It can be questioned whether this was the right method, or if the confirmation should have been done by an outside source. An outside source could, for example, be a person within another company or organisation, that did not have a connection to the company where the investigation was executed. Employees may be influenced by their own company and interpretation with the law, and it therefore would have been beneficial to get an outsider's interpretation, to compare with.

### 5.1.3 Identification of success factors for compliance

The identified success factors for compliance with the legal requirements were based on how the text in the legal requirements had been formulated, and on perceived importance due to external or internal drivers. The reason for the dividing of the success factors is because of the severe difference between the categories. The first one is only based on the requirements and their containing text, and how they are constructed. The other category regards the internal factors that the company has for complying with the legal requirements.

The first category of success factors, based on construction of the legal requirements, where identified during the mapping of the legal requirements. By searching for the key words; education, knowledge, competence, qualification, certification and information, it made it easier and quicker to examine educational demands in all of the requirements, instead of reading through the full texts. This method is applicable in many document analyses, where key words can be identified.

The legal requirements that were organized in sections also made the investigation easier, where the table of contents could be examined to find sections about education. Sometimes, when the educational demands only occurred in a sentence in a section regarding another subject, it could be more challenging to find. This connects to the last success factor in this category, that points out the importance of having sections requiring education, and not only include the demand under comments in the requirements. Not only did the inclusion in the comments make the educational demands harder to find, but it also made them seem less important to fulfill.

Whether the legal requirements are prioritized may also depend on their comprehensiveness. For example, the legal requirements within the environment department are fewer and often more comprehensive. Not only are these more time consuming to examine, but may also not be as clear about specific actions to be taken or specific demands to comply with. The legal requirements in the field of work environment are mostly less comprehensive, and more detailed, direct and focused on specific topics, which can lead to them being perceived as easier to grasp and comply with.

Furthermore, the other category of success factors, based on motivation within the company, were identified during conversations and interviews with the responsible employees. The employees were asked about the reasons for the compliance of some requirements, and non-compliance of others. First, it was presented that legal requirements that contained topics with high-risk factors made them seem important to comply with. Also, if the topics could lead to direct major consequences, they were taken more seriously. Previous accidents concerning something that a legal requirement concerns, could also make them perceived as more important to comply with. Other topics that involve indirect risks or consequences in the future may be perceived as less prioritized.

Some of the requirements were also more strongly regulated than others, which made the compliance of these seem more important and was therefore prioritized. If these were not complied with, the company could risk having to pay penalty fees or get other negative consequences. Requirements that gained attention in, for example, trade associations or stakeholder associations would also get more attention at the company, which can alert the company to comply with the specific legal requirements. This also applied to certain legal requirements that were affected by audits, as the attention could lead to them being perceived as a higher priority to comply with.

### 5.1.4 Plan to develop further compliance with the legal requirements

To further comply with the legal requirements, there are a few suggestions that the company can take into consideration. First, to store all documents in the same place, for them to be easier to find and examine. Second, to write instructions for all of the educational courses, where information about the course can be found, such as which legal requirement it is based on and a reference to this requirement. This can make it easier to examine whether the legal requirement is complied with or not.

The comparison developed in this investigation, between the educational demands in the legal requirements and the available education at the company, can be used by the company to see which legal requirements that have a certain or complete lack of education. These requirements need to be worked with to comply with the educational demands. Similar investigations can be conducted to investigate compliance with legal requirements that concern other departments in the company, and could also focus on other subjects than education.

If the company or other companies would to investigate other legal requirements and their compliance with the educational demands, the success factors identified in this study might be useful. The company could use the them, to search documents for educational demands, instead of having to read through the entire legal requirements. This will hopefully make the mapping easier.

## 5.2 Investigation of active learning in internal education

In the following sections, *Section 5.2.1-5.2.5*, the results from the investigation of active learning in internal education will be reflected over and evaluated.

### 5.2.1 Literature review

The results from the literature review about active learning presented a few different kinds of active elements; discussion of notes, reflection of learning, peer discussion and the flipped classroom model. All of these elements can lead to different positive consequences and should therefore be taken into consideration for the company to use. The use of these, may lead to an increased learning through increased engagement and reflectivity.

These elements are different when it comes to time-consumption and effort, where for example the flipped classroom most likely demands more preparation time for both teachers and students, than the other elements. The longer time a task takes, the more exhausting it can also be experienced as. On the other hand, the flipped classroom model has been shown to have many advantages [16]. That means, that even if it is experienced as time-consuming and exhausting, it might lead to many positive consequences. It is also possible that the time-consumption and effort might decrease in time, when the teachers and students have gotten used to the model.

The other found elements, discussion of notes, reflection of learning and peer discussion, are less time-consuming and might therefore be experienced as less exhausting to use. These active exercises both demand a short preparation time och could require only a few minutes of the lecture. To ensure the advantages of the exercises, it requires that all students or participants take it serious and are engaged in the exercise. In shorter exercises, it might be easier to waste time by talking about other things and not use the time properly.

When using the flipped classroom model, the risk of this is not as likely. The exercises that should be done before the lectures with this model, should be done to prepare the students for the activities during the lecture. The Swedish School Board mentioned this as a potential factor for resistance of the students, because students are afraid to come unprepared to the lesson [17]. On the other hand, this might lead to the risk of students not taking the exercises seriously, might decrease with the increased preparations.

### 5.2.2 Mapping of educational courses

As previously mentioned, the mapping consisted of an examination of the company's educational material and an identification of active elements in the material. In this mapping stage, it could be seen that only a few of the courses contained forms of active learning. In Table 3, it was distinguished that only 9 out of the 39 courses contained active elements, which can be determined as a low use of this learning method. Based on this determination, the conclusion was that a further use of active learning in the educational courses would be advantageous for the company, to further increase the quality of employee learning.

The only elements that could be connected to the literature review was the discussion exercises that occurred. The other elements that where found in the educational courses, 'Questions to participants', 'Concluding exercises', 'Scenario exercises', 'Feedback exercises' and 'Workshop exercises', were identified by characterizing them as exercises that led to increased activity and engagement. The Concluding exercises might be connected to the element about reflection of learning, depending of what the concluding exercise consisted of.

If more time had been available during this investigation, the literature review could have been extended to find the specific exercises used at INEOS Inovyn. This survey will instead mainly be used to present suggestions for other active exercises for the company to use.

### 5.2.3 Survey study

During the survey study, many results emerged. In this section, these results will be discussed and evaluated.

#### 5.2.3.1 Survey answers

Based on the answers for Question 4, it seems most of the participants were satisfied with the team meeting, and that it met their expectations. Although only about 30% of the team meeting participants answered the survey, it is hard to determine if this conclusion is representative. If all of the participants answered the survey, the outcome might have been different.

The answers to Question 5 showed relatively high average grades for all of the lectures, all between 6-8. The lecture about PVC Market and Recycling were provided with the highest average value of grades, and were therefore concluded to be the most rewarding lecture. Considering the lecture did not contain any active elements, the satisfaction would have depended on other factors. Based on the respondents answers to Question 6 and 7, the satisfaction could depend on their own interests and the topics' connections to their daily work.

Most of the answers to the survey, were based on the participants' own interests, and did not contain many inputs about which parts of the lectures that were more engaging or motivating. This made the connections to the use of active learning difficult to determine. If the formulated questions would have been more direct about the use and function of active elements, the answers would possibly have been more useful for the investigation of the use of active learning. To be able to gain more answers concerning the use of active elements, the team meeting participants would perhaps have needed more information regarding the benefits of active learning and and why the survey focused on that particular topic.

The analysis of the survey answers, also consisted of an investigation of potential interconnections between the answers. This part of the investigation did not provide many interesting results, because the answers to the questions differed a lot and no correlations could be found. This could be due to that the employees' own individual interests play a major role in their answers, and that for example, their department did not cause them to respond in a specific way. The difficulty of identifying connections could also be due to the low answer frequency and that there was too little of a base of answers to the survey to draw conclusions about potential interconnections.

#### 5.2.3.2 Answer frequency

The low answer frequency can be based on several things. First, that the different managers or supervisors did not forward the e-mail with the survey to their employees, as the e-mail requested. Through conversations at INEOS Inovyn, this is the course of action that is commonly used at the company for conveyance of information to all employees, but nevertheless seam strenuous for the managers or supervisors.

Another reason for the low answer frequency could be that the majority of the employees are shift teams that only work in periods and therefore might not have been able to answer the survey before the due date. If the survey had been sent out earlier, the answer frequency would probably have been higher. This was not possible due to the restricted time for the investigation. Lastly, even if the survey is only estimated to require 5-10 minutes to answer, some employees might have felt that they did not have the time to answer.

#### 5.2.3.3 Focus group

A topic that came up several times during the focus group with the lecturers was the limited time during the team meetings. The lecturers all mentioned that the time limit made discussion exercises and other active elements hard to implement. A solution to this problem could be the use of the flipped classroom model. This means, that the lecturers, for example, could prepare prerecorded lectures that the meeting participants could watch before the team meeting, and then use the time on the team meetings only for exercises where they could implement their newfound knowledge and insights.

A disadvantage for the use of this model could be that it would most likely implicate more preparation time for the lecturers, and also for the participants. The model could nevertheless provide many advantages as presented in the literature study, such as more effective and creative times in the classroom; higher achievements, interests and engagement from the participants; and the participants getting more involved in their own learning process [16].

Something that the lecturers mentioned, was the planning of the lecture hall. The chairs were placed forward, towards the lecturer, in rows with reasonably close intervals. With the use of the flipped classroom model, the lecture hall could be set up in preparation for discussion exercises. For example, with chairs around tables that are more fit for natural discussions. This classroom set up could also be favorable for normal discussion exercises in groups.

Another opportunity could be to prepare the participants for discussion exercises, to reduce the potential resistance. This could also be done with the use of the flipped classroom model, where the participants the day before could get prepared for the content of the team meeting. The content could have included a short video to watch, as well as a short individual reflection to prepare for the team meeting's discussion exercise. This preparation could make the participants less uncomfortable and surprised about the exercise.

### 5.2.4 Plan to increase the use of active learning within the company's education

To further increase the use of active learning within the company's education, there are a few suggestions that could be taken into consideration. As mentioned in the previous section, the flipped classroom model could be one alternative to use. There are other alternative active elements to use, that could require less preparation time. These elements could be, for example, reflection exercises. Reflection exercises could be applied during the course, about the participants' notes or their thoughts about a specific subject, or after the course, as an evaluation about was has been learned. These reflective exercises would not require much time, but could activate the course participants further and increase their learning.

It could also be favorable to provide all lecturers at the company with information regarding active learning and its' benefits. Since the concept of active learning is mostly known in the school world, few educators in the company may be familiar with it. If more educators know about it, more active elements can be used and the course participants can also become accustomed and comfortable with the active educational courses.

## 5.3 Limitations

The identification of the active elements was based on the literature review and the elements were only counted if they were included in writing in the teaching material. This limitation was applied because of the investigation's limited time and it is likely that more active elements would have been identified if the lectures had been examined in the classroom. If all of the lecturers had been asked about their lectures, active elements could also have appeared.

Based on the unclear definition of education, a working definition of the concept needed to be determined. If, for example, The Swedish Work Environment Authority would have provided a clear definition of the concept, it would have simplified the investigation and would have probably made the results more representative. Unclear definitions can lead to the concept being open to interpretation, which may lead to different interpretations in different companies, and even different employees. It also leads to the difficulty of confirming compliance with the legal requirements.

# 6
# Recommendations

This chapter contains findings for the company, that could be useful for their work and development, both in terms of legal compliance and their quality of education. Furthermore, it also contains suggestions for further work in the areas that have been investigated in this study, to be able to increase the legal compliance and use of active learning even more. The future work applies both to the company's education planners and the lectures, and also to the creators of the legal requirements.

## 6.1 Findings for INEOS Inovyn

In the investigation of compliance with the legal requirements, within the education, requirements with certain or complete lack of compliance were detected. These could be examined further by the company and worked on further, to ensure that all legal requirements are complied with within the company's educational courses.

When it comes to the use of active learning, the company can implement more active exercises in the educational courses. For example, the different elements presented in this study; discussions of notes, reflections in different forms, peer discussions and/or the flipped classroom model. This could possibly make the educational courses more engaging, active and effective.

The analytical frameworks constructed for both of the investigations, could be used in other, similar studies. The analytical frameworks contain detailed instruction about how the investigations were conducted, and reasons for executing the different steps. In the first investigation about compliance of legal requirements, the method consisted of a thorough document analysis, comparison and informal interviews. The second investigation about the use of active learning consisted of a literature review, document analysis and a survey study. These different methods could both be useful for INEOS Inovyn, but also for other company's that work in similar areas.

## 6.2 Future work

During the study, it has been assumed that those in charge or responsible for the different legal requirements have interpreted the legal requirements correctly. This means, that the education that they said is available to match a legal requirement actually corresponds to the demands in the legal requirements. A future task would perhaps have been to examine each educational course further, to really confirm that the content matches what is required based on the content of the legal requirement. It could be useful to add references to several legal requirements to all education courses which had the purpose of matching the legal requirements, to clarify connections and simplify future comparisons and mappings.

The investigation of the compliance with the legal requirements also resulted in a few development suggestions for the creators of the legal requirements, for example, the Swedish Work Environment Authority. One suggestion involves the structure of the legal requirements and the text that they contain. All of the legal requirements are formulated differently, and a more similar use of technology would possibly simplify the examination of them. An inconsistent use of words and concept made the identification of educational demands difficult, and it would therefore be beneficial and clear to use a more consistent words and concepts.

Another future task could be to continue the investigation of the use of active learning. If more active elements would be implemented, it would be interesting to investigate if this increases the quality of the learning. This could be executed by, for example, conducting a new survey after the use of these new exercises, to see if any difference in results can be discerned.

It could also be interesting to to examine the external educations further. In the investigation of the use of active learning, only the company's own educational courses were examined, due to the conditions of the study. It could also be beneficial to investigate the educational courses used for the compliance of the legal requirements, which were conducted by external firms. Whether they use active elements or not, is not included in this investigation.

Furthermore, it would be interesting to compare the results from the investigation of the use of active learning with results from similar studies. This was initially intended to be carried out during the study, but could not be carried out due to the few similar studies that were found, which used similar methods. It was particularly difficult to find studies that were based on the use of active learning in working life.

The analytical framework used in this master thesis, has not been evaluated to the extent that would have been needed to examine how it could have been developed further. This aspect could also be interpreted as a future task, in order to be able to use the analytical framework in other similar studies in the future. The reason why a proper evaluation has not been conducted is also because of the limited time of the study.

# 7
# Conclusions

In this final chapter, the conclusions for the study will be presented. The study was conduced by using methods such as document analysis, different kind of interviews and a survey study. The conclusions are based on the previous chapters; *Introduction*, *Theory*, *Results* and *Discussion*, with the aim of answering the research questions formulated in the study.

Based on the investigation of INEOS Inovyn's compliance with legal requirements, the conclusion drawn is that the Health-Environment-Safety education complies relatively well with the legal requirements, which it is affected by. 13 out of the 46 found legal requirements, had a lack of education, based on the demands in the requirements. The legal requirements were applied to the company's educational courses differently. Some of the courses contained clear references to the requirements, which made the comparison easier. For the other courses that did not contain a clear reference to a legal requirement, the potential connections to legal requirements were more difficult to determine.

Through the comparisons, different success factors that lead to a higher legal compliance were identified, which were divided into two categories. The first one based on how the text in the legal requirements was formulated and the other based on perceived importance due to external or internal drivers. The first category contain, for example, different words used in the requirements or aspects of the requirements construction, that made them more clear and easily complied with. The second category contain reasons for perceived importance for the company to comply with certain requirements, such as requirements implicating high risk factors, that are strongly regulated or have gained attention in trade associations.

To further increase the level of compliance with the legal requirements within the education, a few suggestions are presented in the report. First, to work with the requirements which did not meet the demand for education. Second, to use consistent references to legal requirements in the educational material, which will simplify the matching between educational courses and requirements in planning as well as in review. Lastly, to continue the work with the legal compliance in the future, to ensure the compliance with even deeper investigations.

The investigation of the use of active learning's conclusion is that active learning could be integrated to a higher extent in the company's education. The study identified that only 9 out of 39 educational courses contained active elements, which can be interpreted as a low use. The active elements that were mostly used in the company's courses were those that could be applied quickly to the education and did not require much preparation, such as regular questions to the course participants.

The use of active learning could be further implemented by using elements of active learning in more educational courses, and extend the use by implementing other, more effective active elements. The study suggested other elements such as *Reflections*, *Peer discussions* and *The flipped classroom model*. These could be used to increase the learning within the education.

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# A

# Appendix 1

## A.1 Survey questions

The following questions were formulated for the survey:

1. In which department at INEOS Inovyn do you work?
   (a) Maintenance
   (b) Production (shift)
   (c) Production (daytime)
   (d) Administration (HESC, HR, IS/IT, Economics, Process etc)
   (e) Logistics
   (f) Laboratory
   (g) Other
2. On what occasion did you participate in the work meeting?
   (a) Thursday 2/3
   (b) Tuesday 7/3
   (c) Tuesday 21/3
   (d) Wednesday 22/3
   (e) Tuesday 28/3
3. What were your expectations/goals with the lectures?
4. Do you consider that your experience of the lectures met your expectations/-goals? Please justify why/why not.
5. How rewarding was the following lectures? Answer by marking the scale between 1 to 10, where 1 equals *'Not rewarding at all'* and 10 equals *'Very rewarding'*. (Rewarding in the form of, for example, useful for your work, educational, memorable, interesting or engaging)
   (a) Company information/economics
   (b) PVC Market and recycling
   (c) Project Group
   (d) IT Cyber Security
   (e) Process Security
   (f) Chemical Health Hazards
   (g) Communication and INEOS Brand Refresh
6. For the lectures to which you gave the highest points, describe the reason for the choices.
7. Continuation of the previous question. What parts of the lectures engaged you and why?

8. Could any of the following options have made the lectures more rewarding?
   (a) More images
   (b) More connections to the daily work
   (c) More short discussion exercises
   (d) Group exercises (for example, work shops or scenario exercises)
   (e) More communication between the lecturer and the participants
   (f) Other
   (g) Nothing further is needed
9. If you chose option 'Other' on the previous question, please justify your answer.

## A.2 Legal requirements

In the following sections, all of the found legal requirements containing an educational need are presented. They are translated from Swedish and may therefore differ slightly from the original titles. The requirements are categorized based on their belonging to work department and are presented below:

**Work Environment**

1. AFS 2013:4 The Swedish Work Environment Authority's regulations and general advice on scaffolding
2. AFS 2012:1 The Swedish Work Environment Authority's regulations and general advice on use of chainsaws and clearing saws
3. AFS 2014:20 The Swedish Work Environment Authority's regulations on the use of forklifts
4. AFS 2019:5 The Swedish Work Environment Authority's regulations on synthetic inorganic fibres and general advice on the application of the regulations
5. AFS 2019:11 The Swedish Work Environment Authority's regulations on artificial optical radiation
6. AFS 2005:16 The Swedish Work Environment Authority's regulations on noise and general advice on the application of the regulations
7. AFS 2019:12 The Swedish Work Environment Authority's regulations on vibrations and general advice on the application of the regulations
8. AFS 2019:7 The Swedish Work Environment Authority's regulations on asbestos and general advice on the application of the regulations
9. AFS 2022:4 The Swedish Work Environment Authority's regulations on chemical work environment risks and general advice on the application of the regulations
10. AFS 1999:7 The Swedish Board of Occupational Safety and Health's regulations on first aid and emergency support and general advice on the application of the regulations
11. AFS 1982:3 The Swedish Board of Occupational Safety and Health's regulations on solitary work
12. AFS 2018:9 The Swedish Work Environment Authority's regulations and general advice on the enclosed use of genetically modified microorganisms

13. AFS 2019:4 The Swedish Work Environment Authority's regulations and general advice on diving work
14. AFS 2019:2 The Swedish Work Environment Authority's regulations on blasting and general advice on the application of the regulations
15. AFS 2019:10 The Swedish Board of Occupational Safety and Health's regulations on mast and pole work as well as general advice on the application of the regulations
16. AFS 2014:26 The Swedish Board of Occupational Safety and Health's regulations on building and construction work and general advice on the application of the regulations
17. AFS 2016:3 The Swedish Work Environment Authority's regulations and general advice on electro-magnetic fields
18. AFS 2021:1 The Swedish Work Environment Authority's regulations and general advice on the risk of infection
19. AFS 2010:5 The Swedish Work Environment Authority's regulations on the use of lifting devices and lifting gear
20. AFS 2020:4 The Swedish Work Environment Authority's regulations on the use of work equipment
21. AFS 2008:8 The Swedish Work Environment Authority's regulations on the use of tractors and general advice on the application of the regulations
22. AFS 2014:16 The Swedish Work Environment Authority's regulations on inspection of lifting devices and certain other technical devices and general advice on the application of the regulations
23. AFS 2019:8 The Swedish Work Environment Authority's regulations and general advice on load ergonomics
24. AFS 2010:11 The Swedish Work Environment Authority's regulations on the use of personal protective equipment and general advice on the application of the regulations
25. AFS 2022:2 The Swedish Work Environment Authority's regulations and general advice on use and control of pressurized equipment
26. AFS 2019:6 The Swedish Work Environment Authority's regulations and general advice on quartz -stone dust in the work environment
27. AFS 2009:6 The Swedish Work Environment Authority's regulations on cytostatics and other medicines with lasting toxic effect and general advice on the application of the regulations
28. AFS 2016:7 The Swedish Work Environment Authority's regulations on work in explosive environments and general advice on the application of the regulations
29. AFS 2001:7 The Swedish Work Environment Authority's regulations on anesthetic gases and general advice on the application of the regulations
30. AFS 2012:6 The Occupational Safety and Health Board's regulations on pesticides and general advice on the application of the regulations
31. AFS 2017:5 The Occupational Safety and Health Board's regulations on gases and general advice on the application of the regulations
32. AFS 1988:4 The Occupational Safety and Health Board's regulations on lead batteries for propulsion of vehicles and general advice on the application of

the regulations
33. AFS 2015:4 The Swedish Work Environment Authority's regulations and general advice on organizational and social work environment
34. AFS 1993:2 The Occupational Safety and Health Board's regulations on measures against violence and threats in the work environment and general advice on the application of the regulations
35. AFS 2008:15 The Swedish Work Environment Authority's regulations on systematic work environment and general advice on the application of the regulations
36. AFS 2014:3 The Occupational Safety and Health Board's regulations on fusion welding and thermal cutting and general advice on the application of the regulations
37. AFS 2020:8 The Swedish Work Environment Authority's regulations on testing with overpressure and suppression and general advice on the application of the regulations

**Environment**

1. SFS 2016:732 Electrical safety law
2. SFS 2016:1128 Ordinance on fluorinated greenhouse gases
3. (EU) nr 517/2014 Regulation of the European Parliament and the Council on fluorinated greenhouse gases
4. (EG) nr 1907/2006 Regulation of the European Parliament and of the Council on registration, evaluation, approval and restriction of chemicals (REACH)
5. SFS 2014:425 Ordinance on pesticides
6. SNFS 1990:11 Proclamation with regulations on control of water at accredited laboratories
7. (EU) nr 2066/2018 The Commission's implementation regulation on surveillance and reporting of greenhouse gas emissions in accordance with Directive of the European Parliament and of the Council
8. (EU) nr 762/2018 The Commission's delegated regulation (EU) of establishing common security methods for requirements on security governance systems in accordance with the European Parliament and Council Directive (EU) and on the repeal of the Commission's regulations
9. MSBFS 2020:5 The authority for social protection and preparedness regulations about safety advisers for the transport of dangerous goods (on road and in terrain)
10. MSBFS 2020:5 The authority for social protection and preparedness's regulations about safety advisers for the transport of dangerous goods
11. SFS 2022:366 The Railway Technology Law
12. SFS 2022:417 The Railway Technology Ordinance
13. SFS 2022:418 The Railway Safety Ordinance
14. SFS 1998:808 Chapter 12 §1b of the Environmental Code
15. SFS 1998:808 Chapter 2§ 2 The Environmental Code
16. NFS 2001:2 The Swedish Environmental Protection Agency's general advice on self-control

17. SFS 2016:281 The Harbor Security Law
18. SFS 2014:1278 The Harbor Security Ordinance
19. SFS 2022:367 The Railway Safety Law
20. SFS 2022:365 The Railway Market Law
21. SFS 2022:416 The Railway Market Ordinance
22. SFS 2022:368 National Railway System Law
23. SFS 2014:347 Ordinance on energy mapping in large companies

**Process Security**

1. MSBFS 2014:6 The authority for social protection and preparedness's regulations on cleaning (sweeping) and fire safety control
2. SFS 2010:1011 Law about flammable and explosive goods

**DEPARTMENT OF SOME SUBJECT OR TECHNOLOGY**
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