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Exploring Learning and Unlearning in a Project Context

From a Student Perspective

Master's thesis in Project Management

Supervisor: Bassam Hussein

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Science and Technology

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Abstract

The existing body of literature on organizational unlearning tends to overlook the phenomena in a project context. The studies that do include it are mainly conceptual and empirical evidence is lacking. This paper's objective is to identify areas where Project Managers can effectively facilitate unlearning, understanding the contexts where this facilitation is beneficial. Additionally, the aim is to gain insight to the types of learning that could be supported through intentional unlearning processes in a temporary context.

An extensive search of literature was conducted to understand how learning and unlearning are viewed, with a specific focus on unlearning in a project-context. Data was collected from 68 groups of 4-8 students enrolled in a course in Practical Project Management, over the span of two semesters. Through a qualitative thematic analysis, the findings revealed that knowledge was not frequently unlearned in a temporary context, despite new knowledge being acquired. Unlike knowledge, beliefs and routines were frequently unlearned, and in many cases, the participants identified those as necessary for learning and project success.

Moreover, certain themes of learning and unlearning that more frequently coexisted that indicate that project managers and their teams can benefit from identifying areas for improvement and deliberately facilitating specific unlearning enhance the specific team abilities. These findings lay the groundwork for further research on the topic, as they suggest the potential usefulness of purposeful utilization of unlearning practices.

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Introduction

Unlearning is a debated phenomena with growing interest over the last few decades (e.g. Akgün et al., 2006, 2007, Becker, 2005, 2008, 2010; Hislop et al., 2014; Lee, 2011; Lee and Suokoco, 2011; Tsang and Zahra, 2007, 2008; Visser, 2017). Despite the growing interest, literature remains limited and largely conceptual. Notably, there is limited empirical research on unlearning within a project context specifically.

The literature review in this paper has been conducted to explore the manifestation of unlearning in Project Management Journals. As a part of it, a comprehensive search for relevant literature on unlearning in a project context was carried out. Due to the lack of research in this area, the existing literature on unlearning in organizational and individual contexts is utilized. The literature review includes an introduction to Organizational Learning and Learning in Project-Based Organizations, to increase the understanding of how unlearning and learning coexist in these environments. This paper also includes empirical data collected through reflection reports by students taking a course in Practical Project Management. The reports were written to reflect on their process of defining, managing, and participating in a project.

The objective of this paper is to identify where learning and unlearning coexist. The purpose of this is to address the gap in the literature and provide insights that can guide future research and explore the possibility that facilitation of unlearning by Project Managers can be useful for Project Teams.

Methodology

To gain an understanding and get an overview of the current literature on unlearning in a project setting, literature has been exhausted as described hereafter. The first phase of the search was a preliminary background review. The second phase was more comprehensive and had a stronger focus on the project context and the temporary aspect that comes with it.

Background

To facilitate the understanding of the phenomena of unlearning, organizational unlearning, and learning, on individual, group, and organizational levels, 334 articles were gathered through a search with multiple search engines and uploaded to NVivo. The initial search for relevant studies was conducted by searching for the word *project* along with *learning* and *unlearning* within Science Direct, Scopus, and Google Scholar databases. A keyword search was conducted to select studies for inclusion within the relevant studies. One to three keywords were used at a time, as presented in Table 1. The keyword search included a search in the references of the uploaded studies. The keyword search was continued within the selected articles from the previous search with the words: „intentional“, „rigid“, and „bias“. Articles with a strong focus on organizational change and/or the outcomes of production and construction projects were discarded, if they did not provide insight into the learning process

Table 1: Keyword search

Keyword 1	Keyword 2	Keyword 3
Project	AND: learn*, unlearn*, forget*, discard*	AND: belief*, routine*, knowledge
PBO	AND: learn*, unlearn*, forget*, discard*	AND: belief*, routine*, knowledge
Project-based	AND: learn*, unlearn*, forget*, discard*	AND: belief*, routine*, knowledge
Unlearn	AND: trigger*, belief*, routine*, antecedent*, facilitate*, enable*,	

39 articles were chosen. In addition to the articles, two books were used as supporting material on organizational learning, *Handbook of Organizational Learning and Knowledge*

Management (Easterby-Smith and Lyles, 2011) and for the project context *Let's Really Learn From Projects* (Hussein, 2020).

A preliminary review of the literature was written from the chosen articles, where the need for a clearer image of how unlearning is presented in the project context was apparent. A more comprehensive search was initiated on those grounds.

Exhausting the literature

As the initial search, commenced by utilizing multiple search engines, had been conducted, a second search was conducted within 24 separate management journals. These journals were chosen for a general search of terms while being relevant to the project management context. The second search aimed to identify the general project management literature on unlearning, with a low threshold for inclusion.

The first step of the search for each of the journals was for the term *unlearning*. The search criteria include all parts of the papers for a broad focus. The search resulted in a total of 202 papers. The second step of the search was to narrow the results to papers that have a focus on projects and temporary teams and groups. Within each of the articles from the first step, a search was conducted for the terms *project*, *team*, and *group*. The third and final step of the search process was to textually analyze and determine which of the articles that fulfilled the criteria of the first two steps were relevant for this review. Articles that were excluded did mention unlearning, at least once, but either had no mention of unlearning in a project context specifically, the mention of unlearning was directly based on one of the articles already included after the first phase of the search, and/or did not increase the understanding of unlearning in a temporary context. A total of 168 papers were excluded. The result is a subset of literature consisting of 34 papers that include a mention of unlearning, in the context of projects, teams, and groups from management journals. In addition, 6 papers from other journals fulfilled the criteria and were added to the subset. Those papers were found through a second search of *unlearning* within Science Direct, Scopus, and Google Scholar databases. The 34 papers do overlap with papers found in the first search, and as those overlapping papers were already used, the number of new papers was lower. To clarify, 40 papers were added to NVIVO where the keywords in Table 2 were used as a search criterion again, increasing the paper's coverage of unlearning in a project context.

The search process was an attempt to exhaust the literature on the topic of unlearning in a project context, however, certain material may exist in databases where there is a lack of access and therefore not be included. Below the journals are listed, with the number of articles as a result of the search and the number of articles chosen from said results.

Table 2: Search results divided by journals

Journal	Number of hits on unlearning	Number of articles chosen
European Journal of Innovation Management	36	4
Industrial Marketing Management	66	1
International Journal of Managing Projects in Business	15	4
International Journal of Project Management	19	11
Journal of Engineering and Technology Management	24	3
Journal of Construction Engineering and Management	11	3
Journal of Management in Engineering	5	1
Journal of Product Innovation Management	16	2
Project Management Journal	10	5

After searching and selecting relevant literature, the papers were uploaded to NVIVO for synthesizing. The parts of the papers where unlearning is mentioned were coded, with a focus on the causes and effects of unlearning, the benefits and challenges of unlearning and unlearning in a project context.

The literature gathered in the initial search was utilized for a foundation of understanding of unlearning and learning in organizations. The second search was used to further add to the understanding of unlearning in a project context specifically. The literature is almost entirely in an agreement of categorizing unlearning into beliefs and routines, with the frequent addition of knowledge. These three categories were used to understand the empirical data on unlearning in the temporary project context.

Data Collection

Sample

Data was collected through a convenience sample, as the source of data was easily available to the author of this paper (Etikan, Musa, and Alkassim, 2016). 68 groups of 4-8 students taking a course in Practical Project Management, over the span of two semesters, were asked to complete a reflection report on their process of completing a project. The author of this paper had access to the students of the first semester as a Student Assistant in the course and through the supervisor for this paper, that taught the course both semesters. For the project, the students had the choice of a new product development project, conducting a literature review, or an investigation. The groups were asked to describe instances in the project process where, firstly, learning and unlearning took place, and secondly, where learning and unlearning were essential for the success of the project.

Approach

A qualitative thematic analysis was chosen as the approach for the paper. According to Braun and Clarke (2006), the method is useful for studying many different perspectives, to identify similarities and differences in those. Two approaches were combined when analyzing the data, to add to the depth of the analysis and increase the understanding of the topic in question (Dawadi, 2020). The data was coded into themes that emerged through the data, without consideration of themes that appeared in previous literature. In addition, coding by themes that appeared in previous literature was performed to gain a more holistic view of the collected data in accordance with previous work. The two approaches are called inductive (bottom-up) and deductive (top-down) (Braun & Clarke, 2006). The goal was to increase understanding of the phenomena of unlearning, by identifying the similarities and differences between the experiences related to unlearning and learning reported in the data and make sense of how the two coexist.

While familiarizing with the data by thorough reading, a preliminary categorization of the answers was carried out simultaneously to increase the understanding of the range of answers gathered. Following this first attempt at categorization, all of the data was uploaded to NVIVO for coding, first by a bottom-up approach, where categories of learning and unlearning were detected ad-hoc, and excerpts of data were assigned to codes accordingly. A second round of coding, with a top-down approach based on the literature reviews, was

carried out, where the codes were further analyzed by grouping into the themes of *knowledge*, *beliefs*, and *routines*. These themes were used to increase the understanding of the findings in relation to the literature review and served as a foundation for interpretation (Braun & Clarke, 2006).

Background

Organizational Learning

Organizational learning has been a growing research topic for decades (Wiewiora et al., 2019). Overall, Organizational Learning is viewed as „routine-based, history-dependent, and target-oriented“ (Levitt and March, 1988), where a common theme is an association with improved performance (Tsang, 1997). Argyris and Schön (1978) are frequently cited when defining the phenomena. They suggest that the knowledge of an organization exists through the integration of its members' knowledge. They also conceptualized the process of organizational learning as one where the integrated knowledge among the members is applied to produce performance change.

A lot has been published on the concept since Argyris and Schön's work, where disagreement and confusion surround its definition. One source of complexity in the literature is that learning exists on multiple levels; individual, group, and organizational levels (Argyris and Schön, 1978; Tsang, 1997). Consequently, organizational learning starts with individual understanding and beliefs that are institutionalized and legitimated. This often happens among groups within the organization (Fiol & Lyles, 1985). Tsang (1997) states that the close relationship between individual learning in the organizational learning context and organizational learning brings about some confusion to organizational learning. In addition, a lot of confusion stems from the disagreement on the definition of it and the plethora of researchers creating their definitions. This results in a big variation in the ideas covered in the different definitions that can be found (Tsang, 1997). Even further, the concept is noted to be too abstract and conceptual in the existing research (Armstrong, 2000). Similarly, organizational unlearning faces critique and confusion in those areas (Tsang, 2017).

Despite the complexity and disagreement on the concept, three perspectives on organizational learning are agreed upon by most, and form a broad foundation for the definition of it;

- *Cognitive* perspective, concerning changes in knowledge, understanding, and insights, notwithstanding if the knowledge is transformed into action.
- *Behavioral* perspective, concerning change in behavior, where the definitions are split by a change in actual or potential behavior (i.e. changes impacting future behavior).
- *Social-constructivist* perspective, concerning change in a group's shared knowledge or perception of reality, through its collective actions

Most frequently, the first two perspectives are used to define organizational learning, and how the definition is made depends on the target audience and purpose of the study in which the definition is put forward, using one or both of the perspectives (Tsang, 1997). The third, although less conventional, encourages to view learning through the experiences and social interactions of the individuals in the organization, and the theories of this perspective emphasize generative social practice (Richter, 1998).

Organizational learning is often split into two major categories from the behavioral perspective, single-loop learning and double-loop learning (referred to as SLL and DLL hereafter, respectively). SLL refers to altering actions when there is a gap between intention and what is happening, followed by detection and correction of errors. SLL sustains the assumption that underlying norms and values are valid and that the rules and strategies based on them still serve their purpose. DLL, on the other hand, refers to altering actions only after changing the underlying false assumptions leading to the error (Argyris and Schön, 1978).

Wong et al. (2012) refer to Argyris and Schön when defining organizational learning, and further used two characteristics to define SLL;

- *Working under a set of clearly defined project goals,*
- *Referring to the firm's experience to interpret the performance feedback,*

and two to define DLL;

- *Identifying the root of the problem before taking action,*
- *Seeking and adapting new management and working approaches through evaluation of current practice.*

Learning in Project-Based Organizations

Organizational Learning is a multi-level phenomenon. For multi-level learning to exist within Project-Based Organizations (hereafter referred to as PBOs), project teams must be able to exploit accumulated knowledge (Swan et al. 2010). This includes project-based learning. That is, learning that happens within projects and knowledge transfer to other parts of the PBO (Scarborough et al., 2004). Despite the literature on organizational learning revealing an emphasis on the essentiality of resource allocation for learning, collaborating, and knowledge-sharing activities (Oliver and Kandadi, 2006) what is learned within a project only occasionally reaches other projects or the organization (Swan et al., 2010).

Intra-Project Learning

Intra-project learning occurs within projects when individuals engaging in the project have the opportunity to problem-solve, experiment, reflect and accumulate knowledge while doing so. This type of learning is experiential, that is, created through the transformation of experience. The knowledge is accumulated with a learning-by-doing approach and can be in any shape or form, contributing to an individual's competency development. These individual experiences and insights can then be integrated into the project level with formal and informal platforms. Collective insights from experiences can facilitate even more new experiences when applied to new situations (Hussein 2020, p. 48-52).

Inter-Project Learning

Inter-project learning occurs between projects, or between a project and the parent organization. It consists of the reuse of knowledge from previous projects, kept by the organization, and the dissemination of knowledge to active projects or to the organization for future projects. This type of learning is deliberate, with the purpose to prevent the repetition of the same mistakes, improve performance, and minimize duplicate work (Hussein 2020, pp. 55). There are two views on inter-project learning, depending on how the concept of knowledge is understood, and are briefly explained below:

The cognitive view on inter-project learning is based on the assumption that knowledge is transferrable, and depends on the characteristics of the sender and receiver, their relationship, as well as the knowledge being transferred.

The social constructivist view entails that learning happens through social interactions of individuals during group activities, and can not be transferred otherwise. In that sense, individuals know and are therefore the active carriers of knowledge (Hussein 2020, p.58-59).

Challenges to Project-Based Learning

The knowledge accumulated within projects does not always reach other projects or the organization. According to Oliver and Kandadi (2006) lack of time for learning, collaborating, and knowledge-sharing activities is one of the most common factors hindering project-based learning. Swan et al. (2010) found that even when there are tools and processes in place aimed at knowledge transfer, articulation, and codification (higher-level mechanisms to facilitate inter-project learning), intra-project reliance on experience accumulation and a strong focus on the project outcome results in a lack of motivation for such activities. However, they have found experience accumulation to be the most important way for inter-project learning, with the movement of, or access to, knowledgeable individuals.

Brady et al. (2002) point out a few challenges to inter-project learning in project-based organizations, that exist as a consequence of the nature of their operations:

- *Customization* is often demanded by the customer and decreases repeatability, making it increasingly difficult to apply lessons learned from project to project.
- *Discontinuity* and the temporary nature of projects, including resource constraints, result in strategic issues, performance reflections, and communication often having a lower priority than other more pressing project tasks.
- *Complexity* is often high, as a project can include multiple technical and functional disciplines and demand a range of specialized input
- *Interdependence* between many different, specialized, parts of a project makes it extremely important to ensure compatibility as changes in one area can trigger a chain reaction, resulting in unique and unanticipated problems arising, where previous experience can not be relied on.
- *Uncertainty* of many kinds affects projects, some due to interdependence and complexity, others due to customer requirements and changes in those. Those sources of uncertainty result in lower repeatability and the potential for project-to-project learning.

Another problem that comes up with project-based learning, from the cognitive view, is that not all knowledge is explicit and tacit knowledge must be transformed into explicit for intra-project learning (Michell & McKenzie, 2017). Reflection is a necessary component if that transformation is to happen (Nonaka, 1994). Similarly, knowledge has to undergo several transformations to be transferred to and learned within other projects or the organization (Michell & McKenzie, 2017). This means that the sender must be equipped and willing to send the knowledge and the receiver able to receive and apply it.

Consequently, learning from projects is affected by the behavior and capabilities of the PBO and the project manager. In a study on knowledge transfer from projects to the parent organization, Zhou et al. (2021) detected factors influencing the process, by successfully simulating it to a certain extent with a systems dynamics approach. Similarly to what Michell and McKenzie point out, the transfer of knowledge was shown to depend on the „knowledge stock“ of the project and the PBO (i.e. the amount of knowledge existing within it and its resources), willingness to send/receive knowledge, and ability to send/receive knowledge. The conceptual model, showing all the detected factors, is shown in Figure 1.

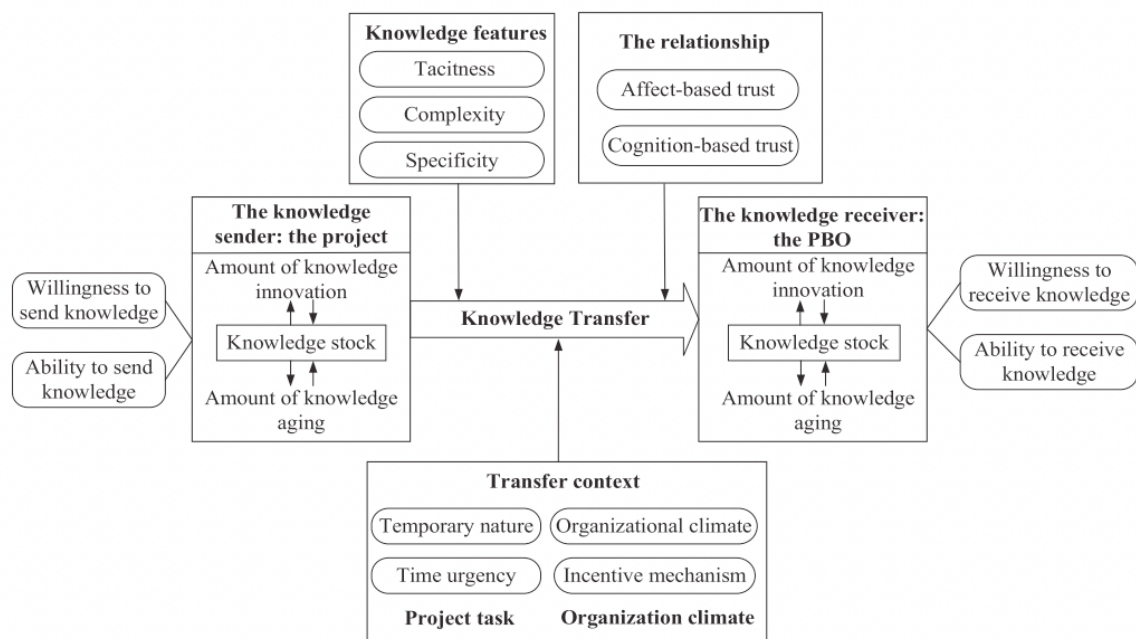


Figure 1: The components of knowledge transfer (Zhou et al., 2021)

The study reveals that a higher knowledge stock of the parent organization decreases the amount of knowledge received from the project throughout the lifecycle, as the parent PBO may deem the knowledge they already have sufficient to meet their business needs. They also

state that their simulation proves previous research that suggests there needs to be a willingness to receive knowledge from projects (Zhou et al., 2021). In simpler words, the PBO has to see the value of learning and be actively willing to learn, while also having the capacity to take in new knowledge.

Comparatively, Hussein (2020) states that to enable learning within PBOs, there needs to be a focus on the attitude toward learning, rather than on establishing processes and systems to facilitate it. This attitude of attention and commitment to learning has to be embedded within the culture (Hussein, 2023). Within projects, project managers are responsible for merging the different organizational and professional cultures that affect the project culture (Ajmal and Koskinen, 2008).

Akgün et al. (2007) state that, even though organizational learning can, and does, exist independently, *unlearning* is contributive to it. Without unlearning, organizational learning could have less impact on organizational performance, or even be blocked by existing knowledge the organization is holding on to (Holan and Philips, 2004).

Unlearning

The amount of literature published on unlearning is growing fast and has been for the last decades (Klammer and Gueldenberg, 2019). The definition of the phenomena is unclear and its existence is still debated. However, several papers and studies are have conducted in attempts to clarify different characteristics and aspects of unlearning, as a means to conceptualize it and increase the ability to operationalize it (Akgün et al., 2007).

Tsang and Zahra's (2008) definition of unlearning; „the discarding of old routines to make way for new ones, if any.“ includes both cognitive and behavioral perspectives. Those are the most common perspectives when defining Organizational Learning. The behavioral perspective is viewing routines as patterns of repeated interdependent actions and fulfills the behavioral perspective, while the cognitive perspective includes the process of sensemaking in performing those routines, and what possibly encourages the individuals of the organizations to identify outdated ones.

Hislop et al. (2014) attempted to define the difference between this phenomenon's conscious and unconscious versions. Deliberate, conscious giving up knowledge, values, or behavior is then referred to as unlearning, as opposed to forgetting when it is unconscious or accidental.

Even further, it has been referred to by them as the capability to give up what is necessary in order not to limit adaptability (Hislop et al., 2014).

What most of the literature has in common, as included in Akgün et al.'s (2007) definition, is that it involves changes in beliefs and routines. A routine „...is a term used generically and includes decision-making, techniques, skills, standard operational procedures, management practices, policies, strategies, information systems, information structures, programs, scripts, and organizational forms.“ They are in place to keep the quality of procedures and processes up by not changing the way things are done, therefore, alternative ways of working are not actively sought after. Beliefs work as a sort of filter that takes in environmental cues and affects how outside events are interpreted and connected to the capabilities of the organization (Akgün et al., 2007). To distinguish unlearning from the general concept of organizational change, Akgün et al. (2007) claim that „[U]nlearning is embedded in the organizational change process. However, the aim of unlearning is not performance improvement per se; rather it is a catalyst for the change process.”.

Klammer and Gueldenberg (2019) created a framework based on the „...intentionality and depth of knowledge loss“ as a part of a systematic review of literature on unlearning and forgetting in organizations. This framework came to be as they noticed themes in the similarities and differences of the literature indicating a range of both intentionality and depth in knowledge loss. Intentionality refers to whether the knowledge loss is due to forgetting or unlearning, and depth to whether it is in the form of systems, procedures, and methods (shallow) or emotions and culture (deep).

Still, *when*, *how*, and *if* unlearning happens as a separate process is a debated topic. Visser (2017) argues that unlearning is impossible as, firstly, negative behavior and thinking do not exist. The human brain's inability to delete information or be turned off makes this a conceptual problem with the above definitions of unlearning. Secondly, he states unlearning is too similar to second-order learning, suggesting that it should rather be seen as a part of the learning process itself.

To address Visser's first point, organizational memory, and individual memory are not the same and the two should not be confused. For an individual, the knowledge gathered is stored in a physical location (i.e. their brain), while that is not the case for an organization in which the storage of knowledge is not as simple (Tsang, 1997). On the organizational level, unlearning and forgetting can be permanent. Knowledge can be discarded and, with time and

changes within the organization or failure to be used by individuals, completely forgotten (Hislop et al., 2014). While individuals can not delete information, they can identify knowledge that no longer serves them and alter behaviors and routines that are built on that specific knowledge, thereby discarding the knowledge without it being permanently deleted (Tsang and Zahra, 2008).

Visser's second point, that unlearning should not be seen as separate from learning, has been addressed in several pieces of literature, including Hedberg (1981), Nyström and Starbuck (1984), Akgün et al (2007) and Tsang and Zhara (2008). While organizational unlearning is often noticed preceding learning or with both happening simultaneously it can be an isolated phenomenon, happening in the absence of a replacement practice or routine (Hedberg, 1981; Nyström and Starbuck, 1984; Akgün et al., 2007; Tsang and Zhara, 2008).

Triggers and enablers of unlearning

In the current body of knowledge, there are several indications as to what initiates the process, as it does not appear to be initiated voluntarily (Akgün et al. 2006, Tsang and Zhara, 2008; Zhao et al., 2013). That is, something must trigger unlearning. In his frequently cited work from 1981, Hedberg highlights how problems are what typically activate the process. Problematic and confusing situations, often due to environmental disturbance and uncertainty, are dealt with by reflection (Wei and Miraglia, 2017). Wei and Miraglia (2017) found a common theme of discrepancy causing a need to reflect. The discrepancy can be caused by knowledge gaps, mismatch of expectation and reality, contradicting information, social conflict, etcetera. The discrepancy causes feelings of discomfort and arousal resulting in personal motivation for the individual to reflect (Wei and Miraglia, 2017), and therefore triggers individual unlearning (Zhao et al., 2012).

Reflection on immediate tasks and problem-solving alone, as in SLL, has been shown with empirical evidence not to be sufficient to enable or directly trigger unlearning, as it requires *critical* reflection. Critical reflection includes deeper levels of reassessing „taken-for-granted assumptions“, as in DLL, and is shown to positively influence unlearning (Matsuo, 2019). Individual DLL precedes organizational DLL. When individuals' mental models have been changed, shared mental models can change accordingly, by the critical reflection of previously unknown and/or undisputed assumptions and norms (Kim, 1993).

Knowledge aging in an organization, as it is referred to by Zhou et al. (2021), includes intentional forgetting of knowledge, similar to how unlearning is described by Starbuck (1996). Hutzschenreuter et al. (2012) point out how individuals can enable organizational unlearning by facilitating the acknowledgment of out-of-date routines, through the utilization of the ability to detect failures, mistakes, problems, or alternative perspectives. Moreover, individuals can trigger unlearning in a team or an organization. When they enter the group, their previous beliefs, knowledge, and experience do too. This can induce unlearning for the individual, the group they entered, or both, in the form of the deliberate ending of current routines (Tsang and Zhara, 2008). The same can take place when individuals leave teams or groups (Klammern and Gueldenberg, 2019).

However, Starbuck (1996) highlights that organizations must create a sense of urgency to facilitate unlearning, for example by having processes in place for effectively making the knowledge unavailable or blocking its usage, as suggested by Cegarra-Navarro (2018).

Similarly, Akgün et al. (2006) state that environmental turbulence induces team crisis and anxiety, which in turn can enable unlearning. Even further, they state it is a crucial factor in team success. According to Lee (2011), stressors in the form of high workload, responsibility, scope, and strict timeframes increase unlearning in a team setting. Lee and Sukoco (2011) further support the hypothesis, stating that a turbulent environment, and the crisis and stress that it brings, increase unlearning on the group level.

Another factor that increases unlearning on the group level, according to Lee and Sukoco (2011), is team reflexivity. Sinkula (2002) agrees with this, also pointing out that, indicated by customer cues, the degree to which the company is linked to its customers is in proportion to the timing and degree of unlearning. The unlearning degree can even further be affected by strategic partner cues and competitive intensity.

Unlearning in Temporary Organizations

The characteristics of unlearning can vary depending on the domain, as they do for learning. As such, individual and organizational unlearning should be separated, and the relationship between the two domains should be considered as it is for learning (Tsang and Zahra, 2008). On the individual level, unlearning is described as a psychological process referred to as a change in belief structure, mental model, or frame of reference, to name a few (Akgün et al, 2007). All of those terms indicate that how an individual perceives reality and/or processes

information is changed. On the organizational level, definitions such as purposely eliminating memories and disintegrating the community's collective infrastructure of routines are introduced, revealing a common theme of „eliminating memory via disconfirmation, the disassembly of the connections and mechanisms of memory and/or changing how memory is manifested“ (Akgün et al., 2007).

“A project is a temporary organization to which resources are assigned to undertake a unique, novel and transient endeavour managing the inherent uncertainty and need for integration in order to deliver beneficial objectives of change” (Turner and Müller, 2003).

Keeping in mind Turner and Müller's definition of a project as a temporary organization, intra-project unlearning must be considered from individual, group, and organizational perspectives. When individuals are brought together for a project they bring with them their own beliefs, knowledge, and experience that can trigger unlearning (Tsang and Zhara, 2008). This indicates that before a shared mental model is established, individual unlearning has to take place.

Zhou et al. (2021) define „knowledge aging“ (see figure 1) as: „the amount of organizational knowledge eliminated due to environmental changes, knowledge forgetting and other factors“. That is, it includes both the intentional and unintentional abandoning of knowledge, despite being called „aging“ which suggests an unintentional nature only. That is, the results of their study apply to unlearning as well as unconscious discarding of knowledge.

In the study, knowledge aging is shown to have a positive relationship with an increase in the knowledge stock of the project, existing within a negative feedback loop of *increase in knowledge stock – increased amount of knowledge aging – decreased knowledge stock* (Zhou et al., 2021). This indicates that „knowledge aging“ (including unlearning) must happen for the stock to go down. A high stock of knowledge decreases the willingness to receive new knowledge, and therefore the amount of knowledge acquired within the project and transferred across its boundaries.

Reflective processes are a prerequisite for making tacit knowledge explicit (Nonaka, 1994), which is necessary to share and learn from others' experiences (Michell & McKenzie, 2017). Even further, collaborative reflection has the potential to induce change in organizational routines by questioning taken-for-granted assumptions (Knipfer et al., 2013) and therefore

promotes inter-project unlearning. Schein (2000) refers to the deeper level of those beliefs and basic assumptions as what the organizational culture represents. Stating that awareness of organizational culture enables learning, as it involves identifying and recognizing the organization's deeply-rooted assumptions and beliefs, supporting Argyris and Schön's work (1978), which suggests that recognizing and questioning basic assumptions enhances the capability for DLL. Thus, organizational culture directly affects knowledge creation and transfer within an organization (Ajmal and Koskinen, 2008). The study by Wong et al. (2012), also reveals a contingency between the effect of DLL on organizational success, and the appropriate practice of unlearning.

The importance and consequences of unlearning

As Visser (2017) highlights, unlearning and processes of reflection can be stress-inducing and „psychologically painful“ to individuals that organizations encourage or force to participate in unlearning. Other than that, there is little evidence that unlearning negatively impacts individuals. On the other hand, Matsuo (2019) provides empirical data supporting the relationship between critical reflection and work engagement, through unlearning. He further emphasizes that intrinsic motivation, stimulated by unlearning, may support individuals when working through such psychological challenges as described by Visser. Matsuo (2019) concludes that the results of the study indicate that deep-level reflections, within the process of unlearning, enhance the work-related well-being of individuals directly.

The greater difference between the existing and new knowledge „... probably increases the need for processes of forgetting of existing knowledge“ (Holan and Philips, 2004). Even further, in their definition of unlearning, they indicate that holding on to old routines and understandings may block necessary learning. In Russell-Hodge's (1995) paper on total project management, he defines a loop of Unlearn – Observe – Learn, where he states that all participants in new projects or value chains must unlearn a part of their mindset to optimize their potential to contribute.

Anchoring biases, as perceptual rigidity is referred to by Dickson (1992), are a result of holding on to old routines and understandings and result in organizations being slower to recognize changes compared to others in the same field. This rigidity can stem from long-term success, resulting in a bias that explains away an organization's failures instead of seeing

them for what they are, as the same routines have always worked with good results, anchoring to the existing cognitive structures (Nyström and Starbuck, 1984). DLL requires a search for the root cause of problems and then learning from them. With anchoring biases, that kind of reflective thinking is not actual, rather SLL is conducted as a means of problem-solving without the detection and correction of errors leading to the problem (Argyris and Schön, 1996). According to Klammer, Hora and Kailer (2023), managers can try to prevent the organization from becoming rigid by making facilitation for unlearning a priority. By unlearning outdated cognitive and behavioral habits, organizations can increase learning, innovation, and the process of seeking new ideas (Zahra, Abdelgawad, & Tsang, 2011 in: in Klammer, Hora and Kailer, 2023).

Zhou et al. (2021) conclude that PBOs are supposed to abandon the ideology of relying on *experientialism* (i.e. „a philosophical theory that experience is the source of all knowledge not purely deductive, formal, or tautological“ (Merriam-Webster, n.d.)). This type of ideology is similar to the anchoring biases described above, standing firm in the same beliefs, based on previous experience, while ignoring what can be learned presently. This can be detrimental to an organization’s future, as research shows (Sun et al 2019) that with the decreased willingness of the organization to receive knowledge, knowledge transfer from projects decreases accordingly. With time, so does the organization’s stock of relevant knowledge as a whole (Zhou et al., 2021).

Unlearning in Project Teams & the Model of Team Development

Tuckman and Jensen’s (1977) model of team development consists of forming, storming, norming, performing, and adjourning. At the storming stage, conflicts arise between individuals while norms of behavior are being established. Rickards and Moger (2000) suggest a two-barrier version of the team development model. That is, there is a weak barrier to transition from forming and storming to norming and performing (standard performing processes). Even further, they suggest that from norming and performing there is a strong performance barrier to cross over to adjourning (outperforming processes). Without going into further detail about their suggestion to alter Tuckman and Jensen’s model, their research shows that *creative leadership* reduces the impact of both barriers. What creative leadership entails according to their work is:

- Platform of Understanding: Making sure the team understands that exploring shared knowledge, assumptions, and beliefs is allowed and facilitates the formation of new ideas
- Shared Vision: The dominant perspective that arises when forming a Platform of Understanding becomes a shared view
- Climate: A positive climate is important for the team
- Resilience: Emphasizing the principle of seeking alternative perspectives when expectations are not fulfilled
- Idea Owners: Commitment to exploring new ideas with the help of capable team members
- Network Activators: Facilitating for the capture of important knowledge through external networking.
- Learning From Experience: Achieving experiential learning

Hussein (2023) suggests that learning and unlearning could be enhanced by fostering a mindset of acknowledging the interdependency between project tasks (enabling communication between team members), recognizing own limitations, asking for help when needed, challenging the established norms and rules, and being receptive to new ideas and concepts. The similarities in these works support Klammer, Hora and Kailer's (2023) suggestion for project managers to prioritize unlearning practices, as the results indicate that a leadership focus on unlearning, in addition to learning, may positively impact the development of a project team and its performance throughout the project.

Findings

The focus of the Reflection Report questions, for the students in Practical Project Management to answer, included both learning and unlearning to explore where the two are different, where they intersect or coexist, and where they were deemed essential for project success by the project teams. The findings suggest that knowledge is not frequently unlearned, despite new knowledge being acquired, in a temporary context. Unlike knowledge, reports of unlearning beliefs and routines was frequent, and in many cases, the participants identified those as necessary for learning or as a precondition to benefit from new knowledge.

The themes identified for learning of knowledge and skills were: *Teamwork, Communication, Project planning, Prioritization, Time Management, Project Management Methods, Project Evaluation, Risk Management, Flexibility and Adaptability, Stakeholder Management, Leadership and the importance of having a leader, and Problem-Solving*. The themes identified for unlearning of knowledge, routines, and beliefs were: *Work Habits, Procrastination, Team Rigidity, Personal Rigidity, Excessive Self-Reliance, Teamwork, Communication, and Perfectionism*. Within each theme of unlearning, the categories of *knowledge, routines, and beliefs* are used to describe the identified experiences of the participants further.

Group numbers that have two digits have answered the questions in English and the quotes are direct quotes from the reports. Quotes from groups with four-digit numbers have been translated from Norwegian.

Table 3: Frequency of the listed themes of learning and unlearning named by the same group

Unlearned	Teamwork	Communication	Project planning	Prioritization	Time Management	Project Management Methods	Project Evaluation	Risk Management	Flexibility and Adaptability	Stakeholder Management	Leadership and its importance	Problem-solving
Work habits	3	2	0	1	0	0	0	2	0	0	1	0
Procrastination	2	1	0	0	1	0	0	0	0	1	0	1
Team Rigidity	4	3	1	4	1	1	1	2	1	4	2	1
Personal Rigidity	1	5	0	1	1	2	2	2	2	3	1	1
Excessive Self Reliance	7	4	3	3	2	1	1	2	2	2	1	0
Teamwork	3	3	2	3	2	0	1	1	1	2	2	0
Communication	2	5	1	2	1	0	2	1	0	1	1	1
Perfectionism	4	4	1	4	0	1	3	1	1	4	1	1

Learnings

Teamwork

Teamwork skills, knowledge, and routines that support teamwork were the most common learnings mentioned by the project groups. Most of the groups that experienced these learnings, also mention having become better at teamwork throughout the project process. Specifically, the groups mention:

Learning to trust in other team members and seeing the value of their abilities.

G0405: „We have increased our ability to trust in others and improved teamwork abilities.“

G05: „A surprisingly important ability [we had to learn] was understanding when it was a good time to ask for support and especially understanding who needed to be involved so that decisions could be made faster and of higher quality.“

G15: „Having trust and confidence: [...] the schedules of the team members and the way of working have differed. Thus, everybody had to learn to accept diverse ways of getting things done and to believe in the other team members“

G19: “...every group work comes with its own challenges. Embracing and adapting to every group member's personality, abilities and implication is very different from one group to another. Every new group project enriches our abilities, techniques, and group management [skills].”

G27: “Throughout this period, we have learned to work as a team, to know how to listen to each other, to take everyone's opinions [into consideration].”

G6661: “When working with people you don't know, you have to trust that everyone does their part and communicates in the event of ambiguities.”

Learning to understand other team members and different perspectives.

G0923: „After the start-up phase it's easier to see that the most valuable learning aspect has been to understand the other team members' ambitions for the course and the project as a whole“

G06: „In Teamwork one of the most important things to be considered is different mentalities. As a group of students that have different backgrounds, we all have different ways to approach tasks. That's why setting rules, ideas and communicating is very important.”

G6661: “Working in a big group gave us the opportunity to learn more about teamwork. We [...] learned to collaborate with others who have different perspectives and experience, as well as working together towards a common goal.”

G21: “The fact that we were from different study areas and cultures led to a wider view on how to solve the different tasks, and we learned to be open to other ways of interpreting parts of the project rather than only doing it in the way that each separately have been doing projects in the past.”

G1515: “[Previously] the team members have mainly worked with students from the same study program. Different subject expertise in a group is therefore not a factor they have had to consider before. The experience from this project, on the other hand, has shown that this can have a considerable effect on the work process, and a sensible distribution of subject expertise is therefore something that all participants will focus on in the future.”

G0021: “As students, the group's members are used to working individually, or with fewer students at a time. In order to carry out this project in a good way, the members depended on working in a team, listening to others and discussing different opinions in order to arrive at an answer. [...] The group feels that the project has given insight into how group projects take place and how a group can contribute to looking at problems from different perspectives.”

G0013: “This far in our studies we have worked with people we know from before. The distribution of tasks becomes easier when you know each other's strengths and weaknesses. In this project, all the members worked with some people they did not know beforehand. [...] It was crucial that the team members adapted to each other and accepted the task distribution.”

G0003: „It was important to learn and get to know each other so that we did not limit creativity and the opportunity to ask critical questions. The limiting factors here we experienced were mainly shyness and politeness.“

Communication

Communication skills, methods, techniques, channels and ways to be able to incorporate those had to be learned by a large number of groups.

G0014: „Being active in the communication channels and giving feedback if requested. When everyone is involved and helps each other it creates a better project, in addition to giving a better overview of the project tasks.“

G0024: „[...] being able to express our own desires while also taking time to consider other suggestions and points of view was important. Good and effective communication led to fewer conflicts later on and was crucial in ensuring that the development process proceeded smoothly.“

Learning the importance of a communication plan and effective communication

G1515: “One useful experience the group gained was that it was necessary to have a contact person between the two subgroups. This was a role that naturally fell to the project manager. Within the group, it contributed to less confusion because the group had a concrete person to turn to in case of questions.”

G1515: “Through regular meetings, there was also a continuous evaluation of the project. This meant that the group could make minor adjustments along the way, clear up misunderstandings, and thus be able to use the time more efficiently.”

G1980: “In addition, collaboration and communication were important to achieve success, especially since there were five designers working on the prototype. To achieve this, the team had to learn techniques such as agile development, which promoted communication and collaboration across the team.”

G1998: “A communication plan that includes how communication within the team should take place helps to reduce misunderstandings and ensures agreement within the team.”

G0008: “The group learned that [...] communication [...] can be difficult to handle in larger groups. Since no one had overall responsibility for the project's progress, there was initially little commitment to bringing the group together, and several members neglected to respond to messages that dealt with the project. [...] a solution to this was therefore to appoint a project manager and set fixed times for when the group should meet.”

G0019: “Having clear communication and clear guidelines for how discussions are to be handled has proven to be very important for the group dynamic.”

G1007: “It can be a challenge for communication not to know each other beforehand, which was the case for parts of our group, but with a good communication plan this was no problem.”

G1709: “Through the project we have gained a better understanding and respect for the communication within groups, and the importance of having good communication between the members.”

G38: “During this project, we learned how to organise ourselves as a group in an efficient way: we needed to hold regular meetings in order to move the project forward.”

G39: “These group meetings were valuable and necessary to create an arena for discussing project related topics and solving unexpected issues. This communication is a crucial factor for the success of a project, as no critical information is overlooked or misinterpreted.”

G05: “Project management must ensure that the flow of information is constant and that emerging problems are resolved.”

G1231: “Good communication was crucial.”

G0025: “[...] it was necessary for each individual in the group to acquire skills in effective collaboration. This meant the ability to communicate clearly, actively listen to others, and be open to constructive criticism. By developing these collaborative skills, the group was able to create an atmosphere of mutual trust and respect.”

Learning to respect and understand cultural differences

G0015: “Communicating professionally in a foreign language: 80% of the team has mother tongues other than English. Therefore, communicating professionally in a foreign language was also an important learning for most of the group.”

G02: “our team members were from different nationalities with different cultures, and different languages. Thus, communication was a crucial skill everyone was concerned about at the start of the project. [...] We tried with great sensitivity to learn how to efficiently convey information, exchange ideas, and pay attention to the other person's message.”

G21: “Collaboration and communication across different cultures [...]”

GR4: “[We learned] Communication with other nationalities.”

G24: “We also needed to learn about each other, and especially small cultural differences could have a greater impact on the work than one would've thought.”

Project planning

Planning of project scope and activities came with challenges for many of the groups that developed skills in that area as a result. The groups mention in several instances how they learned to appreciate the importance of reasonable planning right from the start of a project's lifecycle. Even further, some of the groups mention the importance of having an overview of the project resources when planning, in order to avoid making plans that are too ambitious.

G0000: “The first and probably most important experience the group gained was the difficulty of planning a project where one has little knowledge of the technical details surrounding the creation of the product. This is reflected in our unfinished product.”

G0003: “We had to gain insight into project management and planning that was adapted to our product. We had no relevant experience with this before. We have had to learn how to break a task down into smaller work packages. This is to be able to delegate tasks, increase efficiency and reduce stress.”

G0008: “The group realized early in the project that over-optimism was a problem. The original timetable was too short and too ambitious to solve the task, which was basically to develop an application. By creating a business idea instead, it was

possible to use the time to map important aspects of the application such as key functions, risks, target group and stakeholders. This would not have been feasible if the group spent a lot of time and resources trying to develop the application, which probably would not have worked as desired anyway.”

G0014: “Early creation of a project plan with an overview of the project's life cycle and decision points. This gave a good overview and the project was given clear deadlines that ensured progress. Planning also became significantly easier when the project was divided into smaller phases.

G1998: “Breaking down the project into smaller parts and work packages will contribute in making it manageable.”

G0923: “Another important factor in achieving success in the project is planning with regard to time. In order to complete the product, a successful project plan is needed which ensures that the various phases of the project are completed by the set deadlines.”

G1007: “[We learned] to plan the process, and in that way, also to analyze which activities are dependent on each other.”

G1231: “[We learned that] projects go more smoothly when thorough planning of time and activities is done early on in the project.”

G29: “Early on the group created a preliminary project, which helped setting limitations early on in terms of time and resources. This taught the importance of setting limits to make a project realistic and achievable.”

Prioritization

The groups frequently mention the importance prioritization held for them, and how it was a challenge to acquire the skills and routines necessary to succeed at that.

G9999: “As all the project members had different timetables, it was essential for the project group's success that everyone learned how to prioritize their time better. It was therefore important to plan the week and working hours well.”

G0025: “As the project involved several deadlines, the group was challenged to master effective time management in order to meet these obligations. This meant developing skills in prioritizing tasks, setting realistic goals and resisting the temptation to procrastinate. [...] Mastering these time management skills was crucial to maintaining productivity and ensuring that the project remained on track. [...] [We] realized that prioritizing work and setting realistic goals was more important than striving for unrealistic perfection.”

G13: “Tasks prioritization and timing. Even though we studied it during the course [...] only when putting it in practice did we fully understand its importance. Indeed, it avoided getting stuck at some point because some activities haven’t been done, allowing the project to go on. Moreover, we learnt that critical tasks priority should be split among all the members of the group [...].”

G1789: “We learned to identify and prioritize the critical path in our project timeline. This allowed us to allocate resources more effectively and ensure the timely completion of tasks with the most significant impact on the project’s overall success.”

G24: “For instance, there were several moments where the team knew that the work produced was not optimal but moving on was essential to be able to finish in time.”

G7777: “It was important that the essential functions were prioritized, and other useful functions were included later. This was a new way of thinking to us, and new priorities to take into consideration.”

GR4: “[We learned] To focus on the objects in the critical path.”

G06: “Knowing when to finish a certain task is another important skill when it comes to meeting deadlines. It’s always possible to add more content in order to make it more appealing but if you focus on these details you might lose track of time that can be used for the parts that matter the most.”

Time management

A common learning for the project groups was managing time in a team. This included learning how to consider many different schedules when planning meetings and deadlines and avoiding being too optimistic when assigning time and resources to activities.

G0013: “Each group member therefore had to learn to plan the use of time based on the other group members, rather than only taking into account themselves. This lesson was crucial for good cooperation and communication in the group.”

G11: “Moreover every team member had to enhance his/her time management.”

G1709: “Time efficiency was something we had to learn throughout the semester.”

G19: “Time management - Realistically our GANTT was too optimistic and the time frame too narrow. We did not manage to correctly estimate the workload of the work-packages in the pre-project phase. We quickly ran behind schedule and every task was more time consuming than expected. We therefore had to take a step back before the hand-in of our two reports to slow things down and reconsider our objectives and the projected work for the upcoming weeks. Our second time estimates were far more accurate and feasible than the first ones. This prevented a lot of frustration and stress within the team members.”

G02: “We needed to be familiar with how we could schedule our project and monitor and control it to be able to meet the predefined deadline.”

G9999:” Planning and prioritization: As all the project participants had different schedules, it was essential for project success that everyone learned to prioritize their time better.”

Project Management methods

Some of the groups mention having learned to practice new project management methods, when the different methods are relevant, and how they can be useful.

G0024: “[...] we found greater success by adopting the scrum methodology, which emphasizes the importance of considering diverse viewpoints. This approach required all team members to be open to alternative perspectives and work collaboratively to find the best solution to emergent issues and challenges that arose during the project.”

G20: “To be able to work more closely to the requirements, the team used an agile approach to the project. This was new for most of the team, except the TM, as most of the projects the other team had worked on so far used waterfall-like methodologies where the product is reviewed only in the end.”

Project Evaluation

Evaluation of project status and success, as well as setting clear objectives to be able to do so, are among the learnings the groups mention as important for project success.

G0019: “Clear objectives for the project itself and everyone involved, and that way it will be easier to steer the project in the right direction and measure progress.”

G0020: “The project group has learned the importance of a good evaluation. Evaluating the project was important in order to learn from the experiences gained during the project. This included analyzing what worked well and what could be improved, and identifying any problems or challenges that arose along the way. The evaluation was also useful in identifying success factors and best practices that can be used in future projects”

G1998: “That the project has defined success factors will help the team measure the progress and make sure that the project is on track.”

G0923: “Here the group has learned a valuable lesson about following up with the product at all times and do thorough testing of the parts that are made. In the project plan, one of the success factors was that the group should have good project follow-up.”

G04: “Management skills. The project manager has been able to manage the team and guide us along the way and monitor the progress of the project in every step.”

G06: “Making reports on how things are going, keeping information updated from all members is fundamental and gives you an idea of the progress of your project and allows members to review and check the research made by others.”

Risk Management

Several groups learned how to assess risks, how to manage risks, and why planning for proper mitigation is important for project success.

G0019: “Knowledge of how to carry out risk management was very important in view of the challenges in the project.”

G0024: “During the final phases of the project work this material suddenly became unavailable. As a result we had to come up with a different solution in order to be able to apply the desired functionality to the webpage. From this we learned that in order to maintain control over the project we have to be certain that the source material we use will be available in the foreseeable future.”

G0987: “We saw the value of writing a thorough risk assessment for the pre-report, which helped us identify possible challenges that could arise during the project. By preparing for these situations in advance, we were better able to deal with them should they arise.”

G12: “[We learned] To discuss the risk in advance and also keep the mitigation plan ready.”

G1709: “[We learned to] Develop a risk plan, and handling should something foreseen or unforeseen occur.”

G1789: “The project also taught us the importance of conducting risk assessments and planning for uncertainties. By identifying potential risks and developing contingency plans, we were better equipped to navigate unforeseen challenges and mitigate their impact on the project’s success.”

G07: “[We learned that] You should establish several solutions for your main risks.”

GR4: “Do risk assessment and plan for uncertainties.”

Flexibility and the ability to adapt

An important learning for several groups was how to adapt to changing circumstances and how to be flexible when things do not work out exactly as planned or how the individuals in the group had wished they would.

G0003: “In our experience it is difficult to find a meeting time that suits everyone. Therefore, it can be a great advantage to be flexible in such group work. Then you can

change the time if necessary and you are more adaptable, especially if there are obstacles.”

G0024: “The group also learned that adapting to already established work methodology is a vital aspect of project management.”

G0923: “The project management has experienced that, although the timetable is important, there is much that does not go according to plan along the way. This means that it is important to be able to adjust and get on the right track even if certain parts of the project take longer than planned.”

G27: “We have also worked on our ability to adapt to changes to be made in a relatively short time and the difficulties encountered for certain technical parts.”

G04: “We have [learned to] [...] work under changing circumstances and different scenarios.”

G40: “This has helped us to know that projects don't turn out as we initially planned them, as what seemed easy to do in our heads, has a complexity behind it that we don't realize its magnitude until we really get to work on it.”

Stakeholder Management

A number of groups gained knowledge and experience in stakeholder management. Learning how to communicate with different stakeholders, how to distinguish between stakeholders of different importance, and appreciating the value of including information and opinions of the relevant stakeholders are among the most common learnings.

G0008: “[...] it is valuable learning to meet stakeholders with openness and give them the opportunity to help shape the project.”

G0019: “[We learned to] establish good communication skills, both internally, among the project organization, and externally, with the different stakeholders.”

G0987: “One of the biggest risks we identified was linked to how much interest the students would have in our product. Our market research confirmed this concern as we experienced varying participation from the students. This made us recognize the importance of being aware of our own preconceived attitudes and being willing to

reflect on them. This can help to improve our understanding and communication with the target group, and ensure that the product is adapted to their needs and wishes.”

G11: “Furthermore we deepened our understanding of stakeholder mapping and the different strategies how to handle these different stakeholder groups inside a project.”

G13: “[We learned:] Involving the final users.”

G19: “[We learned:] Identifying and mapping stakeholders.”

G22: “Moreover, we have learned what stakeholders are, the importance they have in a project, as none of us had studied something related to this before, and what it is really important: how to deal with them.”

G23: “[...] Stakeholder analysis: without this task, it is almost impossible to succeed in carrying out a project taking into account all the constraints and paying attention to all the real stakeholders.”

G24: “A crucial learning point in this project was getting insight into the needs of international students who’ve arrived in Trondheim for the first time. They are a crucial stakeholder in this project, which is placed in the G1 category (high influence and high interest). If international students wouldn’t take interest in the product, then we wouldn’t have developed a product worth anything.”

G04: “Our experience suggests that the stakeholders’ involvement is very important because they can play a decisive role in the success of the project.”

G7777: “Through feedback on several iterations of the application, we learned to listen to the users' actual needs rather than our own thoughts about the desired functionality.”

G7777: “The learning outcome for these subject units [working with external communication] was linked to [...] communication strategies, customer management, supplier management, as well as market segmentation and mapping.”

Leadership and the importance of having a leader

Some of the groups experienced how having a leader had a positive effect on the work and allowed the project participants to be productive in their work.

G0020: “It was also important to have a positive attitude to the work and to each other, and to have a leader who could motivate and inspire the rest of the group.”

G0987: “We have learned that a dedicated project manager is essential to ensure organization and targeting in the work, especially in periods of high workloads. In the initial phase, we had problems with distributing responsibility and initiative, but when one of the group members took control, we experienced an increasing degree of efficiency and structure in the project.”

G1234: “The group did not have a clear leader early on who could define goals, distribute tasks and follow up progress. This has led to a lot of time being spent discussing and organizing the project, instead of focusing on delivering a good result. The group has learned that if you want high efficiency also in the early phase, it pays to have a manager from the start of the project who takes responsibility for leading the group in a way that promotes cooperation and efficiency.”

G1515: “The participants were pleasantly surprised by how noticeable a change [to decide to have a leader] had on the group's progress. The distribution of areas of responsibility was more efficient with a manager to lead the way. The project participants rarely had specific wishes about which tasks they wanted to undertake, which made clear the advantage of having a project manager.”

G02: “Leadership is an asset that can help every kind of group work. In our group different people tried to play different roles of a leader to motivate, instruct and offer guidance to other team members.”

Problem-solving

A few of the groups mentioned improving their problem-solving skills and learning how to identify the problem at hand, before finding a solution.

G0025: “During the project, unexpected issues and challenges arose that require strong problem-solving skills. The group members had to learn to systematically identify the causes of the problems, explore and generate several possible solutions, and then carefully evaluate these alternatives in order to choose the most appropriate

way forward. By developing these problem-solving skills, the group was able to effectively handle unforeseen obstacles and find creative and strategic solutions.”

G19: “Using empathy to immerse ourselves in the core of the problem we aimed to tackle. Being proactive to seek end-user insight and going to their workspaces to see what was missing and what had to be changed/improved. This came very handy during the investigation phase.”

G04: “Problem solving skills, it was necessary to identify complex problems and review related information in order to develop and evaluate options and implement solutions thanks to the use of critical thinking.”

Unlearnings

Work habits

Routines from previous project work had to be unlearned by many groups and individuals.

G0405: „The classic problem-solving strategy for engineers had to be put aside, in order to expand our thinking and include more perspectives. This provided the opportunity to gain a deeper insight and a more robust approach to the problem in question.“

G01: “To be able to do this, the group had to discard the more conventional way of studying, which is through reading, taking notes and working with tasks, with more alternative ways. The transition from “normal” studying to studying with the use of games did not come natural for most group members, since they were engineer-students that were used to work in a specific way.”

G29: “In the beginning of the project, when the brainstorming began, the team quickly ended up in discussing solutions on a low level. Instead of discussing the important topics on high level as what is the outcome, impact and benefits of the project, small parts of the ideas were discussed. These small parts should of course be discussed at a much later time. As a team we understood that we had to turn our minds around, and start thinking as project managers.”

GR4: “In our previous projects we did not do the amount of planning we did in this project. We had to plan instead of just going with the flow as we were used to. When tasks on the critical path needed to be done this had to be the focus regardless of how fun one or another tasks were.”

G07: “At the beginning of our project we had a tunnel vision on our solution to create a booklet. After a few meetings, we discussed if it would be better to change our previous solution and add a website. This change of mindset was really helpful to get the best out of our product and make it more accessible to our target group.”

G1515: „ In the past, project participants have often tended to focus on what is going wrong. This has often contributed to intensifying problems and led to a negative atmosphere in the group. This is a way of thinking the participants will try to wean off.“

Procrastination

Routines of waiting to start or finish projects and project activities until absolutely necessary do to an upcoming deadline had to be unlearned by several groups.

G19: „Reactive behaviour - The fact that the project had no review meetings and intermediate deadlines forced every group member to be proactive. Reactive behaviour and laziness could not be tolerated. Constantly anticipating problems and changes was necessary in order to steer the project in the best direction possible.”

G1980: „After discussions within the team, it was agreed that intensive work right before the deadline would not work for this project. It was therefore critical that those team members who had this habit unlearn it and instead work steadily throughout the project to achieve success.“

G34: “Projects where a product is developed can have a fairly tight time budget, and procrastination can be a major enemy to the desired outcome. We had to let go of the ”old ways” of delaying the work to just before the deadline, and start working consistently throughout the project lifetime.”

GR1: “[We had to unlearn to] Do things at the last minute. Taking it at the last minute does not allow for good communication between team members and does not allow for quality work.”

Team Rigidity

Beliefs that previous experiences can be applied in all circumstances and that the initial idea is the only acceptable and realistic outcome had to be unlearned as reported by a few of the groups.

G0017: „we had to put aside previous experiences and theories surrounding the topic. In order to achieve a good result, an objective interpretation of the responses from the survey was desirable. The group's own experiences do not necessarily correspond to reality.“

G0025: „The group's initial assumptions and prejudices had an impact on our thinking at the start of the project. However, the group gradually became aware of the importance of being open and considering several perspectives in order to achieve a more comprehensive understanding of the problem.“

G0923: „The group has also unlearned the belief that only the original idea can be considered a success. Necessary adjustments have been made along the way, which means that the product is not completely as in the original project plan. Nevertheless, the product is still fully functional and capable of carrying out the same tasks.“

G13: „[We had to unlearn that] A good idea is enough. A good idea from a point of view may not be seen as such from another perspective.”

G20: “Another critical belief that had to be unlearned, was that only the best case product could be considered a success. [...] it was important that the team prepared for not losing morale when only the second best thing could be achieved. As the team unlearned this belief, the website got filled with products far surpassing our expectations, thus contributing strongly to the project’s success.”

Routines of making a plan and sticking with it with no adaptation had to be unlearned in order for the project to be successful for a number of groups.

G10 : “We were struggling with seeing the project from a project management point of view because we already had a vision in our minds of how such a project should be completed. Therefore we had to put away this rigid [...] approach.”

G15: “During the beginning of the project, we tried to plan the project very precisely, even though major tasks were distributed. After some time, we noticed that this restricts rather than helps. Therefore, we changed our mind during the project and unlearned this behavior. We simply agreed on important deadlines and everyone was free to choose how to deliver the assigned deliverable.”

G1789: “Unlearning rigid planning approaches and embracing more flexible, adaptive methods allowed us to better respond to emerging challenges and opportunities.”

G23: “Most of the time a project never really goes as planned, so we had to unlearn that building a guideline does not mean that we will actually stick to it;”

G24: “This example also illustrates the second trait that we had to unlearn, which is overly trusting the project planning that we decided on in the beginning.”

Personal Rigidity

Beliefs

The belief that one's own opinions and point of view are correct in all circumstances was a common belief that had to be unlearned by members of the groups. In some instances, it was critical to project success.

G0014: „Although no one had experience from similar projects, it was clear that some took up more space that had to be adapted so that everyone could have their say and be listened to.“

G0017: „Own opinions and views are not necessarily the most correct. Through discussion, the group decided how we wanted to solve the task. There were occasional disagreements about choices that were made, and it therefore became important to see things from several perspectives. If the group agreed on something together, it was important to put aside one's own opinions.“

G0019: „The last point concerns unlearning a mindset of being stiff and rigid. Many of the members are used to having subjects where you only have yourself to think about when it comes to the work you put in and when you do it. This has resulted in some having strong opinions about exactly when things should be done and how much work should be done. We have experienced this as being difficult to make work in a good way in the group. Again, this led to disagreements and little efficiency.“

G0024: „One common belief that we needed to discard was the idea that our own experiences and perspectives were always the most valid.“

G1980: “It can be useful to unlearn the need to get your way, and rather be open to feedback and collaboration, as this can lead to better results. [...] Some had more experience than others when it came to application development and could then provide constructive feedback to the less experienced to help them improve. At the same time, the most experienced also had to understand that they could not always choose the solution they thought was best, because then not everyone on the team would agree. Therefore, it was important to have an open mind and consider other perspectives, instead of sticking to one's own idea.”

G23: “ [...] each member of the group had to, during the brainstorming, unlearn to be close-minded and to impose only their own ideas.”

G9999: “It was important to unlearn the idea that you are always right and that you go into defensive mode when someone makes new suggestions. The result is improved by accepting suggestions and being open to change.”

One group specifically mentioned that team members struggled with not having equal decision-making power within the group, as they got accustomed to the structure chosen for the project organization. These members had to unlearn the belief that the knowledge one possesses is more valuable than the knowledge of others, despite how useful it has been to you.

G1515: „The other group members had to unlearn the belief that everyone is equal when it comes to decision-making, and accept that the project manager had the decisive responsibility for the decisions to be made.“

Excessive Self Reliance

Beliefs that working alone gives the same or better results than working in a team had to be unlearned by some of the groups.

G0024: „Another attitude that we had to unlearn during the project was the belief that we could handle every challenge on our own. Instead, we recognized the importance of working collaboratively as part of a team. By doing so, we were able to utilize each other's strengths and overcome challenges that would have been much more difficult to tackle on our own.”

G13: “At the beginning we thought we would not have had many group meetings to manage the project. However, when we started working we realized that discussing the project together was really important to mix different points of view and to plan the activities.”

G1789: “Abandoning the ”Lone Expert” Mindset. It is crucial to unlearn the belief that only one person holds all the answers.”

G23: [We had to unlearn] [...] working alone but in cohesion with a group, [and] [...] knowing how to do everything [...].

G0405: „One of the attitudes we had to discard early on was the desire to have as much sole responsibility as possible for the end result. This is a group project, and will teach us how a project team works effectively towards a common goal. So one practice we had to unlearn was to change the way we were used to working.“

Routines of taking on a lot of responsibility alone, carrying out the work and making decisions independently had to be unlearned by several individuals and groups.

G0000: „In addition, some of the group members had worked somewhat independently and made their own decisions without communicating with others. This created problems for the group as some members changed parts of the task without communicating it to the rest of the group. The group members had to unlearn this

independent working method, and utilize the group's capacity to reach the goal of the project.“

G0405: „One of the attitudes we had to discard early on was the desire to have as much sole responsibility as possible for the end result. [...] We all had the most experience of working alone, so we all had to accept that we were a team that was meant to work together towards a common goal.“

G0923: „Although several of us were familiar with working in groups, there were only a few that had experience working in a group of this size. The members have had to unlearn having an independent approach to problem-solving, to include all group members in decisions that are made. This has been foundational for the project to be successful.“

G1007: „During this project, the group unlearned to rely only on their own skills for the project to be a success. Therefore, the group learned to trust that the other group members also worked towards the group's common goal.“

G24: „[...]it has also been very important that each member does not display individualism and works as a team with everyone.“

G6661: “The group participants have a lot of experience of working individually and in small groups. What we have learned in previous projects could in this case be an obstacle to the project's progress, and something we therefore had to unlearn. Working in a large group was a challenge, especially since we were used to having full control over tasks we had previously had in a school context. As we delegated the tasks in this project between the various project participants, we had to give up control.”

GR1: “[...] it seemed obvious to us that the best way to proceed was to divide the project into distinct tasks to be carried out. Each member would then have an assigned task that best corresponds to his or her field of study and that would be it. However, this method was not very effective because each member was working alone on his or her part of the project; teamwork was therefore neglected. For the rest of the work, members had to unlearn the practice of working alone on their assigned part of the work.”

G01: “Most of the members of the group were mainly used to working independently with tasks, reading, studying and so on. To be able to develop this product, many of the members had to get used to discarding this way of thinking and working, and instead adapt to work in groups.”

Teamwork

Routines from previous, less structured teamwork had to be unlearned by some of the project groups. This includes, specifically, not allowing teamwork to happen by rather working separately and avoiding having a structure to the organization of the team.

G0003: „From previous projects, the members are used to their own structures and form of communication, because you usually know the entire groups from before. We therefore had to change our approach to project organization and division of labor in order to handle the challenges that arose along the way and improve cooperation in the group. We have had to learn that one group dynamic is not directly transferable to another.“

G0008: „From previous experiences in smaller group projects, [...]each member is more visible and therefore naturally takes more responsibility. Admittedly, this proved not to work in a large group, and a solution to this was therefore to appoint a project manager and set fixed times for when the group should meet.

G0020: „The group had to leave behind the usual approach of having a flat organizational structure, which can be common when a group of friends collaborate on a project.“

G1789: “Unlearning the tendency to micromanage team members leads us to increased trust, autonomy, and productivity within the team.”

G0405: „One of the attitudes we had to discard early on was the desire to have as much sole responsibility as possible for the end result. This is a group project, and will teach us how a project team works effectively towards a common goal. So one practice we had to unlearn was to change the way we were used to working.“

G9999: „We had to unlearn the existing friend group structure in favor of the project-specific one. Here the project manager had to be unlearned from acting as one of the gang to managing the group.“

G9999: „We had to unlearn with respect to the work process. We were all used to working on our own tasks and had limited experience of working together.“

G1998: „In order to ensure success, it is essential that communication takes place across tasks. Here it was necessary to get rid of routines where the focus was only on one's own individual tasks.“

Beliefs that a defined structure unnecessary in projects

G0008: “Here, the group had to unlearn attitudes about how dynamics and cooperation take place in small groups, in order to find a good solution to drive the project forward in a larger group. “

G0020: “The group had to deviate from the usual approach of having a flat organizational structure, which can be common when a group of friends collaborate on a project. While a flat organizational structure can have its advantages, such as promoting collaboration and creativity, it can also be unfortunate in some contexts. Instead of using a flat organizational structure, it was necessary to have a fixed structure in the project group. This meant that it was important to define clear roles and areas of responsibility for each individual member, and to appoint a leader who could take responsibility for coordinating the work and making decisions when necessary.”

G10: “To complete this project, and reap the full benefits of what we learned, we had to put away old ways of thinking. One of these ways of thinking was thinking everything would go smoothly without defining clear roles, but as described in the section before, this only lead to increased apathy in the group. Therefore this belief had to be scrapped.”

G1515: “A hierarchical structure can be extra important to consider if there are many people in the group because there is then a need for more coordination. In future projects, the project participants will therefore be more aware of which structure is chosen.”

G29: “The challenge described in this section got amplified as the team members were both managers and product developers. It was difficult not to think about detailed solutions, when that is what the team has been training for in recent years. Over all the challenge gave the project team a very valuable lesson, that will be taken further in the career.”

G7777: “We have therefore been forced to unlearn the idea that everyone must have full control over everything that happens at all times. Instead, we have tried to build a culture based on independence and ownership of the project, where you work as a team to achieve common goals.”

Communication

A belief some of the groups mention their members have had to unlearn is that constructive criticism and feedback from other members of the group means that they think negatively of the member or that their efforts are not valued.

G0025: „Initially, the group members were defensive when they received feedback or criticism, which limited the opportunity for growth and development.“

G0019: „[Unlearning] Not being able to handle criticism in a good way [...].

G9999: „It was important to unlearn the idea that you are always right and that you go into defense mode when someone makes new suggestions.“

The belief that avoiding conflict will be both the most productive and easiest way toward a successful project had to be unlearned by some of the groups.

G0014: „The fact that the group members knew each other from before led to conflict avoidance, which it was crucial to unlearn in order to have difficult conversations and ensure that everyone worked adequately on the project.“

G1515: „Usually, the participants have consciously tried to create harmony within the group. In many cases, they have neglected to raise challenges or points of view they believe could have been done differently because they believe the problems are not

important enough to sacrifice a good working environment. Many of the project participants describe themselves as being conflict-avoidant, and that they therefore do not want to contribute to and create problems where there are none to begin with. We now see that this is an attitude that can affect the quality of the delivery. If the group actively avoids discussions, many valuable inputs can be missed. Even if one does not agree, it will initiate thought processes and thus contribute to better arguments and more reflective discussions.“

GR1: „[We had to unlearn to] Avoid confrontation. A group where everyone always agrees seems to be the best thing for a work. This is not always really the case. Indeed, the confrontation of members’ opinions can be beneficial for the whole group. So we had to unlearn this attitude of avoiding confrontation.”

Perfectionism

Beliefs that everything has to be perfect to count as a success, according to one’s own opinion, had to be unlearned by some of the groups’ members.

G0025: „The group's previous belief was that everything had to be flawless before delivery, which led to unnecessary time spent on small details. However, it was recognized that perfectionism can hinder progress, and it became clear that it is necessary to find a balance between quality and efficiency.“

G0923: „The group has also unlearned the belief that only the original idea can be considered a success.“

G20: „Another critical belief that had to be unlearned, was that only the best case product could be considered a success.”

G23: “Perfection does not exist, it is subjective and it can block and paralyze certain actions”

G24: “Unlearning perfectionism in this context refers to unlearning the fact that everything needs to be “perfect” or up to the standards of each member in order to be accepted.”

G7777: “It became clear early on that we had neither the capacity, skills nor time to program a full-fledged application. In connection with this change in the project goal, it became clear that we had to unlearn the mindset that all tasks can be done quickly and in a perfect way.”

Routines of focusing on every little detail, without considering its importance had to be unlearned by a few groups.

G0019: „Perfectionism can be an obstacle to development and progress, if you spend too much time and effort on small details.“

G15: „In the end, the engineering team decided to completely discard the calculation and just to choose the motor which they think suits the best based on their experience and feeling. In fact, the motor fitted well and was optimal for the project. Hence, the engineering team unlearned the urge to verify everything theoretically during the project and learned that sometimes it is faster, easier, and more effective to try things out“

G06: “Knowing when to finish a certain task is another important skill when it comes to meeting deadlines. It’s always possible to add more content in order to make it more appealing but if you focus on these details you might lose track of time that can be used for the parts that matter the most.”

Discussion

The differences between learnings and unlearnings

The themes of learnings and unlearnings are similar to a certain degree, but themes that include Project Management, Risk Management, Leadership, Prioritization and Project Evaluation only exist within learning. Themes that are only apparent within unlearning are

Procrastination, Rigidity (Team and Personal), and Excessive Self-Reliance. None of those themes include skills that are particularly appealing or desirable to learn, and as such none of the groups have mentioned learning within those themes. Both learning and unlearning are mentioned in a temporary context, while learning was more commonly mentioned in a permanent way than unlearning, where the students plan to take with them what they have learned and utilize in future endeavors.

The results of the data findings show that all groups acquired knowledge to some extent during the project. However, only two of the groups mention unlearning any knowledge. The first group of the two mentioned gathering information within the project, which the group later found irrelevant due to a change in the chosen information-gathering method

G11: „We also needed to unlearn some practices or knowledge we had. For example, some of us started to gain knowledge and read articles about how to create a good survey because our idea at the beginning was to develop a survey for the company. But after some meetings and discussions, we voted against the survey and decided to execute an interview with the CEO. Therefore the knowledge about the surveys was no longer necessary and helpful for us.“

The second group described how a specific project participant, who knew the field that was relevant to the project, had to put aside his own knowledge in order to be unbiased when conducting interviews:

G38: „When interviewing our construction contacts about security and digital, we also had to unlearn some things. [...]. [Project participant] sometimes had to put aside his knowledge of this field to allow less directed questions to emerge and to be open to other types of answers than those he could foresee from his own experience“

None of the other groups directly describe unlearning knowledge during the project. This may indicate that in a temporary matter, knowledge is infrequently unlearned, compared to beliefs and routines. Alternatively, it could be hard to recognize the knowledge behind the beliefs and routines that are being unlearned. As discussed by Tsang and Zhara (2008) individuals are not able to delete information, but they can identify knowledge that is no longer useful to them and alter behaviors and routines that are built on it, thereby discarding the knowledge without it being permanently deleted.

Learnings and the coexisting unlearnings

The findings suggest a direct replacement of teamwork routines, often referred to as habits by the students. Previous routines of forming project structures, which emphasized minimal teamwork and more individual activities, were replaced by new routines designed to foster increased teamwork while reducing individual tasks. Some teams attributed this change to a difference in team size compared to their previous experiences and differences in habits among team members.

Some teams experienced a transformation in communication dynamics, by replacing negative beliefs about certain communication habits with positive ones. For instance, the avoidance of conflicts and a tendency to 'keep the peace' due to the belief that it negatively affects teamwork were replaced by a belief in the value of addressing conflicts as a constructive form of communication. Additionally, previous beliefs associating all criticism with a negative reflection of a person's work, thereby limiting functional communication within the teams, were replaced by a positive perspective of constructive criticism, enhancing overall team communication. The above examples indicate that learning within teamwork and communication requires the concurrent or prior unlearning of previous beliefs and routines to successfully apply routines, beliefs and newly acquired knowledge to the project.

When did unlearning take place?

Many of the groups describe unlearning while forming the project team, in response to changes, when something had to be learned, when the progress deviated from the project plan, and at other times when stress was high. Unlearning, as reported by e.g. Akgün et al. (2006), Tsang and Zhara (2008), Zhao et al.(2013) and Hedberg (1982), typically occurs involuntarily and is triggered by problematic or confusing situations. Similarly, Lee (2011) points out how stressors like high workload, responsibility, and strict timeframes increase unlearning in a team context. The groups' responses align with the literature indicating that unlearning doesn't happen by choice and tends to happen when stress is heightened.

Project initiation

When individuals form a project group they bring their own beliefs, knowledge, and experience that can trigger unlearning (Tsang and Zhara, 2008). Before a shared mental model is established, individual unlearning has to take place. This includes the norming and storming stages, as described by Tuckman and Jensen (1977), where conflicts arise between individuals while norms of behavior are being established. The discrepancies discovered while forming the shared mental model requires individuals to reflect on their own knowledge, routines and beliefs (Wei and Miraglia, 2017), that consequently triggers unlearning (Zhao et al., 2012). This is reflected in the findings of this paper. Many of the groups mention how they had to unlearn certain beliefs and routines due to working with new individuals, working in a group of a larger size than they were accustomed to, and to build a foundation of good communication to succeed at a project of this complexity. Trust has to be built, conflicts have to be seen through, and a shared mental model formed.

Unlearning Excessive Self-Reliance was the most frequently occurring unlearning with groups that stated to have increased their teamwork abilities. The findings show that it appears to affect the teams' ability to both trust other team members, and to understand other perspectives than their own. As stated by the following groups:

G0923: „Although several of us were familiar with working in groups, there were only a few that had experience working in a group of this size. The members have had to unlearn having an independent approach to problem-solving, to include all group members in decisions that are made. This has been foundational for the project to be successful.“

G0024: „Another attitude that we had to unlearn during the project was the belief that we could handle every challenge on our own. Instead, we recognized the importance of working collaboratively as part of a team. By doing so, we were able to utilize each other's strengths and overcome challenges that would have been much more difficult to tackle on our own.“

G1007: „During this project, the group unlearned to rely only on their own skills for the project to be a success. Therefore, the group learned to trust that the other group members also worked towards the group's common goal.“

For the groups that learned to understand other team members' perspectives, unlearning routines and beliefs that preserve Team Rigidity and Perfectionism were also common co-existing unlearnings. The groups that report learning to better communicate, including respecting each others' differences, the importance of communication and to make communication plans, most often report a co-existing unlearning of routines and beliefs that preserve Personal Rigidity, previous Communication habits, Excessive Self Reliance, and Perfectionism.

The strongest out of all the connections seen between two themes of learning and unlearning was within the Teamwork learning theme and Excessive Self-Reliance unlearning theme. This indicates that beliefs, routines and knowledge that maintain Excessive Self-Reliance are essential to unlearn on the individual level to support teamwork abilities.

Changes

Changes in the environment that affect important parts of the project induce stress within and can, as stated by Akgün et al. (2006), trigger unlearning. Lee (2011) and Lee and Suocko (2011) are in agreement, as they state that a turbulent environment, with the sense of crisis it brings, increases group level unlearning. One of the groups describes this sort of crisis:

G0024: "During the final phases of the project work this material suddenly became unavailable. As a result we had to come up with a different solution in order to be able to apply the desired functionality to the webpage."

The group describes this as a time where they did not maintain control. They later state that:

G0024: „Another attitude that we had to unlearn during the project was the belief that we could handle every challenge on our own. Instead, we recognized the importance of working collaboratively as part of a team. By doing so, we were able to utilize each other's strengths and overcome challenges that would have been much more difficult to tackle on our own."

Similarly, being forced to make changes to the project scope due to the project team being unable to follow the project plan induces stress. For one of the groups, the scope had to be adjusted, which in turn triggered unlearning, as described below:

G7777: “It became clear early on that we had neither the capacity, skills nor time to program a full-fledged application. In connection with this change in the project goal, it became clear that we had to unlearn the mindset that all tasks can be done quickly and in a perfect way.”

Due to delays and lack of time

When project progress didn't align with project plans, many of the teams had stressful scenarios that triggered unlearning, as Lee (2011) described, stressors tend to increase unlearning. An example of a team solving a stressful scenario:

G24: “...we had to reassess the content and the target public in the middle of the project.[...]There were a few different reasons, the main one being that we ran out of time and had to either scramble to fill those sub-sections or deprioritize it. This example also illustrates the second trait that we had to unlearn, which is overly trusting the project planning that we decided on in the beginning.

To facilitate or benefit from learning

The results of a recent study concerning unlearning and ambidexterity in New Product Development teams (Acikgöz et al., 2021) suggest that unlearning through reflective processes leads teams to learn, both in an exploitative and exploratory way. Hartmann and Brensen (2011) state in their case study on partnering in construction projects, that unlearning becomes a precondition to learning and partnering. The study further shows that it mainly happens on the individual level within the temporary team, as opposed to the organizational level, when the rules of the project contradict the individuals' habits. One of the groups experienced and described clearly how unlearning was essential for the team to be able to apply what they had learned:

G10: “To complete this project, and reap the full benefits of what we learned, we had to put away old ways of thinking. One of these ways of thinking was thinking everything would go smoothly without defining clear roles, but as described in the section before, this only led to increased apathy in the group. Therefore this belief had to be scrapped.”

How Project Managers may be able to support specific learning through unlearning

In addition to facilitating for a climate of openness and learning, recognizing the need to unlearn as a part of improving management methods (Laufer et al, 1996), the following observations are suggestions as to how project managers could potentially utilize unlearning as a facilitator or catalyst to learning (see table 3):

- Unlearning knowledge, beliefs, and routines that maintain ***Excessive Self-Reliance*** may facilitate learning skills, routines and adopting beliefs that positively affect ***Teamwork*** and ***Communication***
- Unlearning knowledge, beliefs, and routines that maintain ***Team Rigidity*** may facilitate learning skills, routines and adopt beliefs that positively affect ***Teamwork, Prioritization*** and ***Stakeholder Management***
- Unlearning knowledge, beliefs, and routines that maintain ***Personal Rigidity*** may facilitate learning skills, routines and adopt beliefs that positively affect ***Communication***
- Unlearning knowledge, beliefs, and routines that maintain ***Perfectionism*** may facilitate learning skills, routines and adopt beliefs that positively affect ***Teamwork, Communication*** and ***Prioritization***

Conclusion

The current body of knowledge suggests that project-based unlearning encompasses characteristics of individual, group, and organizational unlearning, due to the nature of projects as temporary organizations that are made up of a group of individuals with their own mental models. The project participants must efficiently form a shared mental model to succeed at fulfilling the project objectives.

Unlearning is shown to be useful to individuals, groups, and organizations. How it impacts a team, team development, and the process of teamwork in the project context is still unclear and literature on the phenomena in that context is scarce and predominantly conceptual. The literature review aimed to support future research by providing an insight to unlearning in a project context, particularly in comparison to learning.

The empirical evidence from the students' reflection reports serve as practical examples, illustrating how unlearning manifests in projects. The students rarely report unlearning

knowledge, while learning and acquiring knowledge is common. Unlearning is shown to happen with urgency, so the absence of contradicting knowledge may make unlearning knowledge necessary. Additionally, there may be knowledge behind the routines and beliefs that is difficult to detect as unlearned. The findings of this paper further indicate the usefulness of purposeful utilization of unlearning practices in Project Teams. They lay a foundation for further data collection and an understanding of how project managers can support improvement of certain abilities by facilitating specific unlearning. The clearest examples of where unlearning has the potential to pave the way for learning, and expedite the process of forming a shared mental model are as listed:

- To support improvement of Teamwork, facilitate unlearning of Excessive Self-Reliance, Team Rigidity, Perfectionism and previous Teamwork habits
- To support improvement of Communication, facilitate unlearning of Personal-Rigidity, previous Communication habits, Excessive Self-Reliance, and Perfectionism

Project-based organizations must have an culture that enables individual and collaborative reflection, as it can either constrain or facilitate unlearning, as well as learning. If the organizational culture is based on a commitment to truth and inquiry individuals become motivated to reflect on their actions, consider how they can induce problems, and recognize the need for change based on those problem-inducing actions (Senge, 1990). This is a clear prerequisite for project managers to fulfill, to have the capacity to facilitate specific learnings.

During the execution of this review, little research was found on unlearning within the context of a project as a temporary organization and how it can impact project teams, what the process of unlearning entails in a project context, and if it is important for project execution success, independent of project outcome. Therefore, further research, preferably including the collection of empirical evidence, is suggested in those areas.

Limitations

This paper has several limitations. Firstly, it is possible that some relevant studies on the subject are not included in the literature review due to a lack of access to certain databases. Secondly, the results are based on a convenience sample of students carrying out a project at university over less than 3 months, and may not be generalizable for unlearning in projects,.

Thirdly, while the paper's results serve as a suggestion to how project managers could potentially support learning by facilitating specific types of unlearning, more research, preferably with more precise empirical data, is needed to confirm what the present paper indicates. Lastly, this review was conducted by one individual and despite attempts to maintain objectivity, there may be biases in the coverage of literature.

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Appendix

The appendix consist of the students‘ responses to questions from the reflection reports specifically addressing learning and unlearning. To manage the length of the appendix, responses to other questions have been omitted.

The questions were as follows:

Look back on the entire process of your project assignment and answer the following questions:

1) What did you need to learn (acquire or gain knowledge, insights or ideas) so that you can handle the emergent needs and challenges of your project? Compose a short list of knowledge, practices or attitudes that you have gained during working on your project.

2) What did you need to unlearn (discard beliefs, practices or knowledge that no longer was helpful or outdated or wrong) in order to handle the emergent issues/problems/challenges during the project? Compose a short list of attitudes, practices or knowledge that you have discarded or found obsolete during working on your project.

Group 1

TPK5100 – Project Assignment Reflections

During this project-assignment, the group met several challenges that required gathering of information from different kinds of sources. This was based on the different activities that were executed, below is an overview of the different activities, and a description on what needed to be learned, how it was learned, and how it affected the project-assignment:

Student-surveys

Prior to establishing an easy and more motivating way to study in the course “Applied project management”, the group first needed to gather information on whether the use of flashcards and a board-game was something that people preferred instead or as an addition to ordinary lectures. This information was gathered through an online survey. From this survey, the group learnt that most of the participants of the survey were quite positive about the solution of flashcards and board-games. The group also learnt that most of the participants preferred to work in groups rather than working alone when it came to study in the course. Based on this information, the group thought it was a good idea to invent a board-game which contained the use of flashcards, but which also emphasized on the benefits of working together to solve different challenges or problems.

Creating the board-game

To be able to create an interesting board game, which highlighted the right purposes, the group had to do comprehensive research among many existing board games to gain information and inspiration for the rules. This was done by searching online through instruction-videos and websites etc. The groups learnt through this that the concept of board games with emphasis on cooperation was already a popular solution. Therefore, the variations of games were many and highly interesting. As a consequence of this research, the game-rules were made with inspiration from many of the existing games looked upon.

Creating the questions/tasks

The boardgame and the flashcards contained questions and tasks which were related to both the theory of the course “Applied project management” but also to relevant case-studies. It was therefore necessary to go over the theory in the book, and to analyze the cases chosen by the group. Collecting this information has shown to be highly important for how to formulate the questions especially related to the different cases.

Creating the game-design

The person responsible for creating the game-design, that is the game-board and the front page of the game, had to learn how to use Adobe Illustrator. The group member working on this had some previous experience with programming and modeling, but had not used this design-tool before. Because of this, the learning of the programme was crucial for achieving a

game-design, which again played a big role in making the game attractive and functional to the players.

Moving to the “unlearn” component, we would like to highlight that when working with this project and developing the product, the group also had to put away or discard some ways of thinking, especially when it came to the way we were solving problems and working with the courses on a general basis. Some of our biases and concepts we had to unlearn are described below:

Teamwork

Most of the members of the group were mainly used to working independently with tasks, reading, studying and so on. To be able to develop this product, many of the members had to get used to discarding this way of thinking and working, and instead adapt to work in groups. This was not only because the project-assignment was stated as a group-assignment, but also because the game that was going to be invented, relied on the principles that group-work can be more beneficial than individual work. It was therefore important that the group implemented this way of thinking to themselves, and then be able to carry on this idea to others playing the game.

Studying through games

The original purpose of this assignment was to develop alternative ways for students to work with the course. To be able to do this, the group had to discard the more conventional way of studying, which is through reading, taking notes and working with tasks, with more alternative ways. The transition from “normal” studying to studying with the use of games did not come natural for most group members, since they were engineer-students that were used to work in a specific way. However, since the produced game turned out very effective and quite interesting, it all worked out fine in the end. The group is now hoping that this game will maybe change the different ways of studying for more students, as they also try this game with time.

Group 2

There is no doubt that learning was an underlying goal of this project that could lead to improving professional skills and knowledge of team members. Our team members were from different nationalities with diverse backgrounds and to some extents were familiar with project management concepts. This was an opportunity for the team to divide the tasks according to people's experiences and others can increase their learning through these experiences.

But whether we work in each role in the project assignment (as discussed before), we were required to improve both technical and soft skills. Having such skills and qualifications can benefit all of us in nearly most of the job positions, and work environments in the future. At the start of the project, we reviewed the project managers' required qualifications and discussed what skills and knowledge are necessary and could make our project successful.

according to our first plan and the challenges we faced during the project, what we have learned are categorized into two sections as the following:

Technical skills: although there are many different technical skills that every project manager should be familiar with, learning or being familiar with some of them was necessary for our project.

- Scheduling: We needed to be familiar with how we could schedule our project and monitor and control it to be able to meet the predefined deadline.
- Risk management: Anticipating any threat against the project and taking measures in time
- Preparation/Good planning: same as all projects, we were also required to prepare a suitable and implementable project plan, which led us to strengthening our knowledge and acquire some useful experience in this field.
- Reporting: Being able to document any finding during the project execution, and after, this helps to keep record on matters concerning the project.
- Literature review and searching methods: Being able to search for required information from reliable sources/ platform and utilizing them for the project.
- Integration: one of the knowledge areas of project management that every project manager should learn and be professional in it. We practiced this skill in our team by integrating all project changes, decisions, inputs and findings.

Soft skills: we believed that soft skills could help us succeed in our project and could positively affect our performance in the team. For such a project, soft skills were much more important than technical skills and we have attempted to identify the required ones, discuss them, and learn them not only from the literature but also from each other. Some of the most important ones are as follows:

- Leadership: leadership is an asset that can help every kind of group work. In our group different people tried to play different roles of a leader to motivate, instruct and offer guidance to other team members. For example, motivational skills, prioritization, goal setting and stress management were some of the leadership skills practiced during our project.
- Teamwork: as we do not have any organizational structure and the project was a strong model of teamwork, we were required to work well in teams and have interpersonal skills. This was necessary to help us to effectively collaborate with each other. Our group members come up with great experience in skills needed for teamwork including cooperation, friendliness, respect, commitment and collaboration.
- Communication: as mentioned before, our team members were from different nationalities with different cultures, and different languages. Thus, communication was a crucial skill everyone was concerned about at the start of the project. We used a variety of communication methods such as in-person conversations, virtual meetings (Teams), WhatsApp group, and telephone calls. We tried with great sensitivity to learn how to efficiently convey information, exchange ideas and pay attention to the other person's message.

1) What did we need to unlearn (discard beliefs, practices or knowledge that no longer was helpful or outdated or wrong) to handle the emergent issues/problems/challenges during the project? Compose a short list of attitudes, practices, or knowledge that you have discarded or found obsolete while working on your project.

Although there were plenty of items we have learned through this project, we distinguished that there are some beliefs and methods we are not required to learn or implement them in the project. In the following some of them are mentioned:

- All team members are not required to be competent or knowledgeable about all related subjects. For example, it was not necessary that everyone knows a restaurant

business model in detail or to be professional or have a good experience in risk management or everyone should be capable of doing a professional interview with the stakeholders.

- The project does not necessarily need a project manager with the traditional responsibilities. According to our agreement, all team members were responsible for all the results, and we mostly used leadership approaches to manage the project instead of a project manager.
- Project does not necessarily need to use historical methods such as waterfall methods for project management. In this project it was tried to use new project management approaches such as agile methods (without implementing them officially) for project management. For example, holding several meetings during the week and dividing the tasks like product backlog concept were the methods we used in managing this project.

We believe that all we have learned during this project can give us a professional advantage not only for our career path but also for carrying out our daily professional affairs.

Group 3

During the meeting with Statsbygg, we were pleasantly surprised that Statsbygg is specifically focusing on how to contribute to as low greenhouse gas emissions as possible and to reuse materials in the new buildings. This demonstrates that the construction sector works to reduce their carbon footprint in all parts of the project.

The learning outcome from the project itself was huge. As this was an investigation into an industry that is unknown to the group, the learning curve regarding the construction industry was steep. In addition, we investigated how the industry handles the recirculation and reuse of materials and products. It has been enlightening to discover the potential, and where the process of implementing a circular economy meets resistance. As confirmed from the conversation with Statsbygg, the will and desire to implement sustainable measures is high. However, the construction sector's biggest contribution is to sort out the waste they produce during construction. The paperwork necessary to reuse products and materials is either non-existent or too demanding to do. One could discuss that the demand for knowing more about the system for reusing materials and highlighting the issue regarding this could contribute to improving the situation. There more who knows, the closer we are to a solution.

Regarding the project management, we have made some reflections on our own role and contribution to the project. We have also given each other constructive feedback on what could have been done better, so that we can evolve on the feedback. This is shown in Table 3.

A common habit in team projects is that group members use team meetings as a “check-point”, and then sit by themselves and contact the rest of the group through technological platforms such as Teams. If that is going to work, the task being done and the deadline for the task needs to be very clear and strict, and the communication needs to be at a certain level.

This project is to a large extent based on creativity, and our experience is that the group is most productive when we sit physically together. We had to unlearn that relying on technological communication alone is insufficient when the deadline is approaching fast, and the task to be solved is complex.

Group 4

6.1. Learning

This project has allowed us to acquire new knowledge in various fields. Thanks to which we were able to handle different situations and challenges. Here it is a short list of them:

- *Communication skills*, we have learnt that the way you communicate with your project team and stakeholders is important for the success of the entire project.
- *Analytical and research skills*, ability to assess different scenarios and do all the required analysis.
- *Flexibility/Adaptability*, we have managed to work under changing circumstances and different scenarios.
- *Interpersonal abilities*, even if we have known each other before the project, we have been able to build a good work environment to complete the project in a good way and we have been also able to keep trust during the entire project duration.
- *Problem solving skills*, it was necessary to identify complex problems and review related information in order to develop and evaluate options and implement solutions thanks to the use of critical thinking.
- *Ability to plan, organize and prioritize work*, ability to plan all the tasks and ensure that we keep up with all the deadlines.
- *Managements skills*, the project manager has been able to manage the team and guide us along the way and monitor the progresses of the project in every step.
- *Computer skills*, we have learnt how to build an entire website designing all the parts and try to solve all the bugs.

We can also describe a situation in which we were forced to learn to go on with the project. At the beginning of our journey none of us was able to design a website since we didn't have this previous knowledge. So, trying to understand how to start to develop our website was the first challenge we faced. At first, we gained as much information as possible and after a lot of trials and despite some unexpected situations, thanks to our commitment and adaptability we managed to finish the website.

6.2. Unlearning

Despite all the obtained knowledge, we have also found out that some practices or beliefs are not always true for all the projects. Before carrying out this project, we believed that it was necessary to have mostly convergent ideas among the team members so that making decisions was very simple. But during the project we realized that this is not the case, major of the time it is necessary to compromise and finally coming to a decision is not a quick and easy process, it could take a lot of time.

Here it is an explanation on how we handled this kind of situation. During the choice of which functionalities should have included in our website, we all have different ideas. We ended up making a list of advantages and disadvantages for each of our ideas and each of us managed to explain why we should adopt his/her ideas instead of those of others. We finally found a deal and at the end we adopted a mix of all ideas.

Group 5

1) **What did you need to learn** (acquire or gain knowledge, insights or ideas) so that you can handle the emergent needs and challenges of your project?

Working with new systems and technologies meant that we all got new knowledge depending on our background. However, we would like to focus on the general aspects of the development game:

- The importance of carefully planning the tasks to be carried out and assigning them fairly, making sure that there are no team members who are too stressed while others aren't at all. The workload required by the developers was very high, and in some moments it was necessary to learn how to rebalance task assignments.
- The students, who held the managerial position, did not have high IT skills since they came from a different educational background than developers. This made it clear that it is very important for project management to have adequate knowledge of the business domain of the project that they have to manage, because otherwise there would be too much distancing between the departments. That could cause misunderstandings and reduce collaboration. These students had to learn some of the main activities of app development processes so that they could communicate better with the developers.
- Project management must ensure that the flow of information is constant and that emerging problems are resolved. Moments of silence can lead to misunderstandings and therefore problems could cause discontent of members and delays in deliveries.
- A surprisingly important ability was understanding when it was a good time to ask for support and especially understanding who needed to be involved so that decisions could be made faster and of higher quality.

Can you describe or reflect on situations where learning was critical to the success of your project?

- A team member who was in charge of the planning and control learned some programming techniques at a time when the workload of the developers was the highest. With this move, he was able to improve the link between management and development. He had gone into the details of the app development and at the same time facilitated a rebalancing of the workload.
- Recognizing the time when communication declines is easy, but talking about it is difficult. Nevertheless, we came up with the idea that everyone should write on shared documents their personal opinion on the continuation of activities and the current state, and this brought out the fact that we needed to raise the levels of motivation and communication. It was very helpful.

2) What did **you need to unlearn** (discard beliefs, practices or knowledge that no longer was helpful or outdated or wrong) in order to handle the emergent issues/problems/challenges during the project?

- The team thought it was enough to have the information obtained by interviewing end users (either through interviews or surveys) to make a valuable product. During the project, we realized that conducting research and comparing our product against similar products offered in the market helps to get interesting insights and understand useful features that perhaps the interviewed customer is not aware of.
- The team thought a weekly team meeting would be a good system to keep up with the progress of the different parts of the project, but found that in many situations, small updates through online communication were sufficient.
- The team needed to unlearn that the only way of distributing a mobile application is true native applications published on an official app store.

Can you describe or reflect on situations where unlearning was critical for the success of your project?

- Although physical meetings were useful for being productive and to ensure good communication, at times of high project workloads, it was helpful to replace the in-person meeting with quick updates on Discord. If we had not done so, we probably would not have used the time optimally and the developers would have been more stressed.
- During planning of technology that would have been used for creating the app, the team thought it would have been necessary to put the application to official app stores to ensure its distribution. After a research of PWA technology, the team instead found that the application could be served as a normal web-site that could be downloaded as an application instead, while still fulfilling the distribution requirement. The simplification saved the team a lot of time, as uploading to official stores can be a huge hassle, as well as making the process of updating the application a lot slower.

Group 6

What we needed to learn

1) In Teamwork one of the most important things to be considered is different mentalities. As a group of students that have different backgrounds, we all have different ways to approach tasks. That's why setting rules, ideas and communicating is very important.

2) Knowing when to finish a certain task is another important skill when it comes to meeting deadlines. It's always possible to add more content in order to make it more appealing but if you focus on these details you might lose track of time that can be used for the parts that matter the most. For example, in our case trying to use many programs that get better video quality required a lot of time but would only do a small change to our output. Putting too much effort on this would have not added as much value as getting information summarized in a way everyone without previous knowledge of the city could understand easier.

3) Making reports on how things are going, keeping information updated from all members is fundamental and gives you an idea of the progress of your project and allows members to review and check the research made by others.

4) How to work with the theory learned in class, even though all students in a project have different backgrounds because we all are taking the same class, the information and strategies taught in them are a good starting point on how to face the project and tools that we all have in common.

What we needed to unlearn

5) More information is not always better. When we started the project, we focused on getting all the information possible to create a website with all possible questions a student could have but while progressing we realized that too much information could be not user- friendly to read. It is important to do research on other platforms, focus on the main priorities and create links to other pages that can answer students' questions.

6) Sometimes using too many tools can make the workflow more difficult even though these tools are supposed to make things easier. When we were deciding on what programs to use in order to coordinate our work more efficiently, we encountered the problem that a lot of us have never worked with the same programs. The best option was to use what we all have experiences with (e.g. excel), even though it might not be the best program, but it saved us time, because everyone was able to start working immediately.

Group 7

6.1.1 What did we need to learn

- Designing a booklet in Canvas
- Establishing a website
- Focusing on our project
- You should establish several solutions for your main risks

First of all we had to get the knowledge on how to create and design a booklet for our target group as this is our main product. As we decided to also develop a website with information for our users we had to gain knowledge on this topic too. If we would not have learned these two things we would not be able to finish our project.

6.1.2 What did we need to unlearn

- change of mindset
- willingness to get more and more information
- biases

At the beginning of our project we had a tunnel vision on our solution to create a booklet. After a few meetings, we discussed if it would be better to change our previous solution and add a website. This change of mindset was really helpful to get the best out of our product and make it more accessible to our target group. In addition, it was very helpful to have been in the position of our target group, but it could also be a pitfall. We all had our own opinion on what we missed out on in the beginning, but that does not necessarily mean that that was true for the majority of the students. Therefore, we had to be really careful with our own biases in the processing of the survey and to keep an objective look at the results.

Another important skill to unlearn was the will to get more and more information. At first, we thought it was important to gather as much as possible. Later in the project, we figured out that it was impossible to put all the helpful information in a booklet. This unlearning came at the same point in the process as the change of the project. It was therefore important to not completely stop gathering more information because we could still use it on the complementary website, but for the booklet, it was important to filter only the most important parts.

Group 10

What we learned

In this project, it has become apparent that having an assigned person to arrange meetings/work sessions and make sure everyone is en route with their tasks is highly beneficial. Having “everyone” be project managers, ironically enough, increases apathy in the group. This phenomenon is called the *bystander effect* (Emeghara 2020), and it is a known phenomenon that having more people with the same responsibility diffuses the responsibility, leading to a lower likelihood of anyone stepping forward and taking lead in a situation.

For the completion of this project, it then became critical to at least appoint someone to be in charge of the production and assembly of the product. It also became critical to establish weekly meetings to do work related to the course. After this was done, the productivity of the group went significantly up.

One of the biggest challenges we faced in this project actually took place after the product was produced and assembled. We struggled to reflect on our own management skills. As a group composed of purely engineering students, we are used to approaching a project with a very “matter of fact” attitude, with little regard to the interpersonal aspect of a project. The whole group was initially very pleased with the opportunity to complete a product-based project, as this is very specific and easy to do with our background. Realizing that this project actually revolved around the management of the project, rather than the product took some time, and we found it very challenging to look at it from a pure project management point of view.

This change in mindset led the group to reflect more on project management, and we gained some new tools for reflection.

To summarize we learned:

- The value of assigning roles and areas of responsibility
- Acknowledging the interpersonal aspect of a project
- Reflection

What we unlearned

To complete this project, and reap the full benefits of what we learned, we had to put away old ways of thinking. One of these ways of thinking was thinking everything would go smoothly without defining clear roles, but as described in the section before, this only led to increased apathy in the group. Therefore this belief had to be scrapped.

As mentioned before, we were struggling with seeing the project from a project management point of view because we already had a vision in our minds of how such a project should be completed. Therefore we had to put away this rigid way approach, and rather be open to other ways of viewing a classic product-based product.

This was extremely critical in the process of writing these reports, as the old mindset simply would not allow us to produce reports that reflected the applied project management course.

To summarize we unlearned the following practices:

- Thinking that everyone could manage one project without clearly defined areas of responsibility
- Only thinking of the product in a product-based project

Group 11

A) What did we need to learn?

We had to gain new knowledge for our assignment and also improve some practices and attitudes inside the project group. First, we expand our knowledge about **how to create expressiveness and specific questions for our interview** with the CEO. Therefore we discussed in the group our previous know-how about this topic and looked on the internet for assistance and suggestions. Furthermore we **deepened our understanding of stakeholder mapping** and the different strategies how to handle these different stakeholder groups inside a project. For this point we read our lecture notes again and also looked in the literature about this topic. We also had to **gain knowledge about strategies how a company can enter a new market**. Therefore we also look in different books and on the Internet. Moreover one group member dealt with these strategies at her home university. We also had to **learn more about the company Life Science Robotics** and the general purpose of this start-up. To do this we looked at the website of the LSR and read the texts. We also watched the videos there and searched for the Instagram page because it is important to know as much as possible about this company to collaborate well with the same aims for the project. We created our video with a software which is called “Animaker”, and this is the reason why we had to **learn more about this application** and how it works.

We also had to improve some of our practices for the project assignment. For example, we **worked consequently on the project and had regular meetings** where we discussed everything which was relevant to the progress of the project work. Moreover every team member had to **enhance his/her time management**, because we were the same group members for the hand-in assignments as for the project assignment. Hence we had a huge workload every week with both assignments.

The attitudes of the team members also improved through this project work because we had to **work reliably on our own tasks** and furthermore help the other members with problems or take care of each other.

B) What did we need to unlearn?

We also needed to unlearn some practices or knowledge we had. For example, some of us started to gain knowledge and read articles about **how to create a good survey** because our idea at the beginning was to develop a survey for the company. But after some meetings and discussions, we voted against the survey and decided to execute an interview with the CEO. Therefore the knowledge about the surveys was no longer necessary and helpful for us.

We had to unlearn some practices too within the project. For example we normally **execute an interview after we define the focus** of the investigation. But this time we did not have the focus before the interview because we identified the problems of the company and what we might be able to improve after talking to the CEO of LSR. Moreover we had to unlearn **some methods of how we did citations** at our home university before or **how we formatted the references** correctly and find a new method to do this so that every team member is satisfied.

We also had to unlearn some attitudes which we learned at our home universities for this period of the project time. Especially some **approaches in connection with how we write an investigation paper (structure etc.)**. This is strongly connected to the practices previously described.

Group 12

Look back on the entire process of your project assignment and answer the following questions:

1) What did you need to learn (acquire or gain knowledge, insights or ideas) so that you can handle the emergent needs and challenges of your project? Compose a short list of knowledge, practices or attitudes that you have gained during working on your project. Can you describe or reflect on situations where learning was critical to the success of your project?

- a) Creating a positive and open working environment so that everyone is ready to take additional responsibility when needed. This is important also to avoid any complexity since multi cultural members were involved.
- b) To plan and analyze the interdependence of each deliverable well in advance.
- c) To discuss the risk in advance and also keep the mitigation plan ready.
- d) To keep the communication between project members going all the time.
- e) In case of Investigation report, good skills in Microsoft excel is needed for analysis of result.
- f) In particular to this project, some of the project members learnt how to prepare laundry detergent from chestnuts.

2) What did **you need to unlearn** (discard beliefs, practices or knowledge that no longer was helpful or outdated or wrong) in order to handle the emergent issues/problems/challenges during the project? Compose a short list of attitudes, practices or knowledge that you have discarded or found obsolete during working on your project.

Can you describe or reflect on situations where unlearning was critical for the success of your project?

Project manager was the most senior member for the project with some years of industrial experience. Being senior or more experienced does not mean you are an expert at all . Throughout the project, instead of an authoritative environment, she created an healthy and open environment where everybody can freely express their opinions. The project members were the brains behind this investigation idea and the role of project manager was to monitor

the execution and jump in with implementing additional tasks when needed. In the end we felt there is no need to have strict project structure and an informal environment helped the project.

In particular to this project topic, we were under the impression that horse chest nut does not have use. However we found chestnut to some extent can be used as a laundry detergent to remove mild dirt, though not as a complete replacement for commercial detergents.

Group 13

1. Learnings:

- **Knowledge of the context.** It is the starting point and is necessary to have a clear overview of the environment that surrounds the potential stakeholders, the common behaviors and the culture. Discovering it is so important because it's the environment in which we have to develop the project.

- o ● **Involving the final users.** Since the beginning, our project has focused on improving students' life, which can be achieved in different ways. Therefore we decided to ask directly to the students what they were looking for and we made some quick corridor interviews to have some spontaneous hints in order to understand their needs. Moreover, during the whole process we continuously involved the students to have feedback about the website.

- o ● **Tasks prioritization and timing.** Even though we studied it during the course with the network diagram, only when putting it in practice did we fully understand its importance. Indeed, it avoided getting stuck at some point because some activities haven't been done, allowing the project to go on. Moreover, we learnt that critical tasks priority should be split among all the members of the group, so as to speed up the project.

- o ● **Technical side.** We needed to learn how to create a website, to manually import events on Google Calendar and to create a program in order to do it automatically, once the organizations sent their events.

Learnings were particularly critical to the success of the project during interactions with the stakeholders. Indeed, having a deep knowledge of the context, the expected benefit of the website and the functioning of it has allowed us to better answer their questions and cooperate.

Un-learnings:

- **Equal treatment for stakeholders.** The practice of interacting with the stakeholders as they were equally important is wrong, indeed the relationship with them should reflect their influence and interest. For example, at the beginning we communicated with big and small organizations in the same way, but we should have approached them in different ways.
- **A good idea is enough.** A good idea from a point of view may not be seen as such from another perspective.
- **Giving up on negative or missing answers.** While contacting all student organizations, there were many that didn't even answer and some that declined our offer to join the project. Initially we decided not to insist, but then we realized that if we were really interested in involving those organizations we had not to give up. Actually we persevered in keeping the organizations informed about the project and in some cases we succeeded in convincing new ones.
- **Marginal importance of team discussions.** At the beginning we thought we would not have had many group meetings to manage the project. However, when we started working we realized that discussing the project together was really important to mix different points of view and to plan the activities.

Group 14

Un-learnings were significant especially when we had to face problems according to our risk management plan. In fact the preventive actions were based on assumptions which sometimes were disattended, so we had to adapt the project to real problems.

Look back on the entire process of your project assignment and answer the following questions:

1) **What did you need to learn** (acquire or gain knowledge, insights or ideas) so that you can

handle the emergent needs and challenges of your project? Compose a short list of knowledge, practices or attitudes that you have gained during working on your project.

Among some important insights we had to gain and ideas we devised while on the process of our project, we can find:

- ● Relevant contemporary construction cases from different countries that could be adequate to our purpose.
- ● Modern building standards regarding human comfort and safety.

- • Signposting inside public buildings. We did not know how strict the signposting protocol

was. After our research, we now clearly see how important it is to give a building proper safety signs, not only for emergency cases such as fire, but also for daily use when people need to get oriented where they need to go.

- • Vocabulary and terminology in terms of architecture and different techniques for refining unfavorable results, leading with mid-process problems or planning from the beginning.
- • The optimal time of the year for construction projects may be spring on a first thought, however, it was in autumn that both of the projects studied began, as during

this season of the year building materials and other costs are usually less in demand, making it easier and less time-consuming to obtain.

- • How long construction projects usually take until they are finished.

Can you describe or reflect on situations where learning was critical to the success of your project? As there was a main division in our group in regard to the project's structure, the division of some of us working on the French case and others on the Spanish case, both groups of us decided that we had to gain a minimum of knowledge on how to measure the quality of an architectural project. All of us met a few times to study and make ourselves as clear as possible to be on the same level of knowledge and have the less biased information, or at least the same biased information.

2) What did **you need to unlearn** (discard beliefs, practices or knowledge that no longer was helpful or outdated or wrong) in order to handle the emergent issues/problems/challenges during the project? Compose a short list of attitudes, practices or knowledge that you have discarded or found obsolete during working on your project.

Can you describe or reflect on situations where unlearning was critical for the success of your project?

- We expected that main reason for a construction project to fail would consist of big mistakes, such as architectural facilitate. However, we discovered that small problems can end up taking a significant toll on a project's process and results. This fact was also critical for our success.

Group 15

To achieve a successful project, the project team needed to learn and unlearn several hard- and soft- skills. In the following, knowledge, behavior, insights, or ideas that had to be learned or unlearned are shortly presented. Furthermore, if specific examples are available, it is explained in which situation these (un-)learnings were critical to the project's success

1. Necessary Learning:

- *Basic knowledge about water turbines:* as the main goal of the project was to build a functioning, easy to use water turbine, everybody had to gain knowledge about the principle of water turbines
- *3D-printing skills:* almost all mechanical parts of the water turbine were created with a 3D-printer. Although one of the team members already had experience with 3D-printing, he had to expand his knowledge about constructing water turbines and how to use the 3D-printers at NTNU
- *Having trust and confidence:* as mentioned earlier, the schedules of the team members and the way of working have differed. Thus, everybody had to learn to accept diverse ways of getting things done and to believe in the other team members
- *Total consensus on important decisions:* At the very beginning of the project, it took us quite a long time to decide on which product to produce, as everyone had promising ideas, but there was not one idea having the agreement of all of us. Although we discussed having a majority vote to decide what to do, we finally decided to take another turn and tried to find a product which fits everyone. Finally, this led to the water turbine, which everyone was excited about. If we had gone for the majority vote, there is a high probability that the involvement of the team members would not have been as good as it was with the water turbine and therefore, the success of the project could have been endangered. Hence, during this critical phase of the project, we learned that it is important to have a total consensus on major decisions
- *Communicating professionally in a foreign language:* 80% of the team has mother tongues other than English. Therefore, communicating professionally in a foreign language was also an important learning for most of the group. We learned to take enough time to explain complicated things, not to take everything word by word, and to ask too often rather than too seldom

2. Necessary Unlearning:

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- *Verifying everything theoretically:* At one point of the project, the engineering team needed to select a suitable motor. Since there are a lot of different motors, having many variables, such as torque and rotational speed, it is not easy to choose a suitable one. Therefore, the team tried to do some calculations and to verify theoretically which motor to buy. Unluckily, at this stage of the project there were too many unknown variables, so it was not possible to do a proper calculation. In the end, the engineering team decided to completely discard the calculation and just to choose the

motor which they think suits the best based on their experience and feeling. In fact, the motor fitted well and was optimal for the project. Hence, the engineering team unlearned the urge to verify everything theoretically during the project and learned that sometimes it is faster, easier, and more effective to try things out

- *Detailed planning*: During the beginning of the project, we tried to plan the project very precisely, even though major tasks were distributed. After some time, we noticed that this restricts rather than helps. Therefore, we changed our mind during the project and unlearned this behavior. We simply agreed on important deadlines and everyone was free to choose how to deliver the assigned deliverable.
- *Having regular meetings*: Connected to the previously mentioned point, the team tried to organize weekly meetings to talk about the current state of the project. After a while, we noticed that the meetings were not effective, and that other work could have been done during the time spent. In consequence, we unlearned or changed this behavior and switched to meetings that were held when everybody thought that a meeting was necessary

Group 17

Learning some skills and techniques and gaining knowledge about some topics could help to do this project better, and these topics are as follows:

- Group decision making
- Working in a stressful situation
- Coordination techniques
- Problem-solving techniques
- Time management
- Risk management

We are a group of six (6) students from different countries with different cultures and backgrounds, however, we strictly worked on common goals & interests. We understand, respect, and listen to everyone's opinion and assess which are applicable on our project. With all the process we have gone through on the execution of this project, we all believe that learning the techniques of doing group work and especially group decision-making could help us. Some of the ways of thinking, beliefs, and knowledge that each of the group members had before the implementation of the project, and finally, during the implementation of the project, each of us realized that they were no longer updated or were wrong and should be deleted are as follows:

- Initial thinking that project managers will not entertain our request to interview them considering their status, schedule, and the confidentiality of their information. Although there are some that did not respond on our request due to time constraints, but there are a lot of them that granted our request and are willing to share all their experiences and lessons. Hence, we cannot jump into conclusion and generalized the situation.
- A wrong way of thinking that some of us had the beginning of the project was that we thought that doing this project as a group might make us unable to get the ideal result. Everyone preferred to works alone, they can work with more concentration and can adjust the work according to their own will and time with a better result of the project. Since we are all new to each other, we don't trust yet. But along the way, the trust is built as well as the camaraderie with each other that help increase the efficiency of the

work. Working in a group ease the pressure and load of work as it is being shared by everyone, lessen the stress knowing that someone will help you and you know that you are not alone. The environment is enjoyable. This is one of the important lessons for us for this project.

Group 18

The entire process of project assignment has required us to modify some of our pre-existent beliefs and knowledge, both acquiring new skills and discarding outdated or wrong practices.

1) First, during the development phase of the project, we learnt the importance of having members from diverse backgrounds. Our multidisciplinary background became a relevant and positive aspect during the work, as it gave us the opportunity to maximize the potential of each figure. For instance, we were able to use Giacomo's previous knowledge in CAD design and in performing FEM analyses. This knowledge was gained through participation in university projects such as the international FSAE competition. Damiano was able to solve several interdisciplinary problems and simplify our work using his computer science background. We were able to take advantage of Ilaria's economic-management background for budgeting and work planning by implementing operational tools such as the WBS and Gantt chart.

Later, as we developed our work, we had to improve to cope with the many unexpected events that occurred at each stage. We learnt that inconveniences are inevitable in a project of any kind, so we had to be flexible and adaptive to deal with all incoming problems. To set such condition on our working mind we applied some principles of Agile philosophy, in order to have a group structure and a whole group attitude more prone to address such unexpected events. For example, in our working group we applied the Scrum framework, which is one of the most practical applications of Agile. This set of practices and rules resulted in becoming more transparent in our activities, in reducing the task complexity and therefore duration, to work on an iterative way and check the intermediate results of each micro-task, and in conclusion in giving to us a more adaptive approach to cope with the unexpected events.

In the end, we learnt the crucial impact that proper time planning can have on the success or failure of a project. Related to the previous point, scheduling activities in the right way is the best option to have a clear view of the project requirements in terms of efforts and results. It also helps the team to create some useful “buffers” of time to deal with potentially incoming problems and have time to solve them. For instance, we were able to schedule activities in the right order (checking interdependencies and priorities) and stick to the schedule we had set.

2) In second place, the entire process required us to discard some of our previous beliefs and practices to reach the targets on time and with a satisfying result. An example situation in which this need emerged can be identified with the need to involve more the commissioner of the product, along with the different stakeholders. In the first lesson of the course, for example, we were split into teams, and we were assigned a project of building a tower composed by sheets of paper only. In that case, as the professor pointed out, none of the groups showed up to ask for more information about the project and its aims from the commissioner, which was the teacher. This made clear that the customer needs to be involved in the project. As a result, in the project we needed to discard the procedure we used in that small project and acquire a new one, involving the customer along with all the stakeholders.

This helped both in a better understanding of their aims, their needs, and the real importance of the deadlines in this project.

Group 19

Looking back on the whole process of our project, here are some of the things we had to learn and unlearn in order to succeed.

What we had to learn:

- - **Critical thinking** - At every step we take in the process, it is important to think critically

about whether nothing has gone wrong. A mistake discovered only later can have bigger consequences than being there right away. Thus, critical thinking can ensure that we detect errors earlier during the project. Questions after each step such as: ‘What have we achieved now? Did we add some value? How can we move forward?’ can help to achieve this.

- - **Estimating and mapping workload (Time management)** - Realistically our GANTT was too optimistic and the time frame too narrow. We did not manage to correctly estimate the workload of the work-packages in the pre-project phase. We quickly ran behind schedule and every task was more time consuming than expected. We therefore had to take a step back before the hand-in of our two reports to slow things down and reconsider our objectives and the projected work for the upcoming weeks. Our second time estimates were far more accurate and feasible than the first ones. This prevented a lot of frustration and stress within the team members.
- - **3D-printing (workshops)** - Some of us did not know anything about 3D-printing. Therefore, we had to follow a 3D-printing workshop with “MAKE NTNU” to gain the right knowledge. We learnt about the different machines and their applications. This step was critical to unlock our access to 3D printers and prototype our design(s).
- - **New CAD softwares** - During the prototyping phase, our group had to select one CAD software. We chose *Fusion 360* because of its ability to combine multiple users on one project. Most of us were used to *Créo*, *Blender* and *Solidworks*. CAD designers therefore had to promptly learn and adapt to this software’s features. This technical adaptation was decisive to rapidly create our CAD designs.
- - **(Applying) Project management tools** - Identifying and mapping stakeholders, success factors and criterias, WBS and work-packages as well as RACI became a lot more concrete when applying them in the pre-project report. Likewise, the more abstract notions linked to project management success became a lot clearer as we applied them during our own project.
- - **Furniture design specifications and norms** - During the state-of-the-art research, we were able to get a lot of insight into norms and “rules” of furniture design. We found some interesting and valuable information about the color codes and their effect on studying and creativity. These interesting facts and “rules” discovered in the state-of-the-art study were then applied to the prototyping phase.
- - **Teamwork and group management** - Even Though this might sound as an obvious and deceitful attitude, every group work comes with its own challenges. Embracing and adapting to every group member's personality, abilities and implication is very different from one group to another. Every new group project enriches our abilities, techniques, and group management faculties. This even evolved during the project as roles and responsibilities changed with the different steps of the project.

- - **Design thinking attitude** - Applying the skills some of us had learned during our design thinking course. Using empathy to immerse ourselves in the core of the problem we aimed to tackle. Being proactive to seek end-user insight and going to their workspaces to see what was missing and what had to be changed/improved. This came very handy during the investigation phase.

What we had to unlearn:

- - **Reactive behaviour** - The fact that the project had no review meetings and intermediate deadlines forced every group member to be proactive. Reactive behaviour and laziness could not be tolerated. Constantly anticipating problems and changes was necessary in order to steer the project in the best direction possible.
- - **Grade driven mentality** - Working for the grade was not the right way to approach this project. The project had to be addressed from an immersive project management perspective. This allowed us to tackle issues and map our work with greater objectivity. The immersion process was key to fully engage in the project and fully engage in it.
- - **Fictitious scholar work** - Leaving aside the fact that this task was a scholar project, it was key to engage in it. At the start we kept going back to the fact that the project was fictitious and that we were pretending to address a problem that we had fabricated. Leaving this futile mentality behind was key to engaging in the project and gaining the whole meaning of the project.
- - **Obstinate vision and mindset** - At first, we all shared the idea that there was not enough space to study at Gløshaugen. After seeing the results of the survey, we had to reflect on this idea. So, it was a case of not just following our own ideas but considering results from a larger group. After exploring these, we had to change our main purpose of the project from 'space-creation' to 'space-optimization' which had a big impact on designing our product. It was thus very important to not just stay at our 'tunnel vision' idea but instead be open to others' experiences.

Group 20

As identified in the project plan, the team had the individual domain knowledge about veganism and software development for the project, but needed to acquire knowledge to connect these two domains. To do this, it was important for the team to utilize relevant tools for the development process, and to document the needs of the target audience.

To bridge the gap between technicalities and domain knowledge, the team used Sanity as a database that could be populated with data through a good graphical user interface. This tool made it quick to set up these technical entities, so that the people with domain knowledge about vegan products could focus on gathering data, and the TM could focus on the website.

Creating a survey as well as later analyzing it was a new challenge that the group members had to face. Above all, asking specific questions in order to draw the most meaningful conclusions possible for user needs without prescribing too many opinions or ideas to the

respondents was challenging. The later evaluation of the survey, for example to find significant correlations between the statements, was also a task that the group had to learn at least in part.

To be able to work more closely to the requirements, the team used an agile approach to the project. This was new for most of the team, except the TM, as most of the projects the other team had worked on so far used waterfall-like methodologies where the product is reviewed only in the end. However, to learn agile it was important to unlearn the waterfall practice of only doing end-of-project evaluations. Using an agile development methodology made the team able to constantly review the product and make changes to the listed requirements and tasks. As an example the team wanted originally to implement a page for listing the different stores, but while the site was developed realized that filtering products was a more valuable

feature. This was because the products are the most important part of the product. Without reprioritizations like these, the product would just be a cluster of hard to find information.

Another critical belief that had to be unlearned, was that only the best case product could be considered a success. Originally the team wanted real-time product data directly from the stores, which would populate the website with a lot more data more easily. Through risk analysis the team realized that this was a crucial part of the application, but could be hard to do in time. Thus, it was important that the team prepared for not losing morale when only the second best thing could be achieved. As the team unlearned this belief, the website got filled with products far surpassing our expectations, thus contributing strongly to the project's success.

Group 21

In this project we learned a lot of important lessons related to project management. A practical and "real-life" project made the learning experience both challenging and rewarding. During the project we have gained an insight in how to do a literature review and thoroughly going through articles and books with a scientific view. Not only picking the first and best, but reading and finding the ones with credible sources and authors and then being able to discuss the topic with the other members. This also gave the discussion much more depth as we all became very competent on the areas we were writing about.

The fact that we were from different study areas and cultures led to a wider view on how to solve the different tasks, and we learned to be open to other ways of interpreting parts of the project rather than only doing it in the way that each separately have been doing projects in the past. As we were a group of students who are usually working alone on assignments, there was a learning outcome of having to adapt to working with people on different time schedules who uses dissimilar work approaches. This was a part that had to be unlearned and the group had to compromise and find the best possible way of working that made every member satisfied.

Because of the challenges that occurred during the project, the team learned the importance of having an agile approach when problems did occur. By having an agile mindset and a good risk management plan, it is easier to adapt and tackle problems during the project.

Below is a short list on the most important lessons learned during our project assignment:

- Collaboration and communication across different cultures and personalities • Adaptation and flexibility during project management
- Planning and execution of a project
- The importance of motivation and dedication

- The importance of a risk management plan

In addition to valuable lessons learned, the team members have also unlearned previous mindsets, habits and knowledge. Since this project team consisted of people from different cultures and study areas, the members had to unlearn previous habits and adapt new ones.

Below is a short list on the most important lessons unlearned during our project assignment:

- Unlearning of previous work habits and the establishment of new ones
- Unlearning of previous communication habits and the establishment of new ones

- Unlearning of personal mindsets and adaptation of new ideas

Group 22

Things to learn:

Because of what we are studying, almost all the members of the group already had some idea of how to design a website, but those who did not, have learned. Some members of the team have not taken subjects related to managing a project or starting a business, so they have learned how to do it and the whole process involved. Moreover, we have learned what stakehold- ers are, the importance they have in a project, as none of us had studied something related to this before, and what it is really important: how to deal with them. In addition, we are also now aware of the different risks a project can have and we have learned how to deal with some of them, as we needed to do it for our project.

Things to unlearn:

Due to our beliefs, according to what we studied, we had prioritized the creation of an app. We finally saw that, in this case, a website was more useful. We also believed that we would need a lot of advisers and it is true that if we want to make our product get further in the future we are going to need them, however if the product is really useful our users (mainly students) are the best promoters we can have, given the fact that they are very interested in its success, so they will tell their friends and colleagues about it and the project will become known and used for more users.

Group 23

In order to succeed in this project, we had to learn and put in practice a lot of project management skills. Here is a short list of knowledge, practices or attitudes that we have gained during this project:

- Theoretical knowledge of project management to write the report;
- Research on existing products in the hemiplegic equipment market - in other words, we learned to benchmark;

- Empathy to imagine the daily life and needs of people with hemiplegia in order to make a functional product that really meets a need;
- Carrying out an effective brainstorming focused on "product development", where the challenge was to invent a new and multi-functional product;
- Focus on effective communication and make sure we are all on the same page;
- Work as a project team: make a schedule, follow it and make sure that everyone does the tasks that have been assigned to them (without putting pressure on them – transversal management)
- Use the material resources at our disposal in an autonomous and secure way.

We faced different situations where the knowledge acquired was critical for the success of our project. For example, without having learned what we had the opportunity to learn during our courses, we would not have been able to establish a schedule and stick to it in order to work effectively. We could also have misassigned

the tasks to the team members, which could have created discord and therefore affected the quality of the project. Another critical point would have been the stakeholder analysis: without this task, it is almost impossible to succeed in carrying out a project taking into account all the constraints and paying attention to all the real stakeholders.

On the other hand, in order to succeed in this project, we had to unlearn the knowledge and foundations that we had long adopted to face problems and challenges. Here is a short list to illustrate our point :

- No longer confine ourselves to our convictions and ideas to integrate and project ourselves into the ideas of other people in the group;
 - Not wanting to be a leader by imposing your choices and ideas;
 - Not working alone but in cohesion with a group, not knowing how to do everything and delegate tasks;
- Most of the time a project never really goes as planned, so we had to unlearn that building a guideline does not mean that we will actually stick to it;
- Perfection does not exist, it is subjective and it can block and paralyze certain actions;
- Planning is not the most important thing to focus on, at the risk of exploding budgets, losing sight of the real stakes of the project or forgetting its purpose;
- Do not rush headlong thinking you have understood the subject but take time to reflect, take

a step back and temporize our actions.

These points can be illustrated by examples, especially during the pre-concept and design

phase of the product, where each member of the group had to, during the brainstorming, unlearn to be close-minded and to impose only their own ideas. This allowed not only to increase creativity in the project but also to identify and choose

solutions that meet the requirements and objectives, and not personal desires that could lead to the failure of the project. All this made it possible to obtain a final product that fully met the specifications. Another example we can mention is thinking before acting. Indeed, in our case, the desire to go directly to a phase of finding a solution, concept or design was tempting.

However, the success of the project can be partly due to the good organization of the beginning of the project which allowed us to frame it, by knowing the objectives, the stakes, the needs, the expectations and therefore not to lose time by going into unnecessary and inefficient work, and meeting deadlines.

Group 24

What we needed to learn

When developing a website some technical know-how is needed no matter if the website is made from scratch or by using a template; how to add text, pictures and link the different parts of the website together to a coherent product. Also the usage of Trello had to be taught and learnt by the group members that've never used it.

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We also needed to learn about each other, and especially small cultural differences could have a greater impact on the work than one would've thought. In Norway, time is denoted with the prefix *Kl*, as mentioned earlier.

A crucial learning point in this project was getting insight into the needs of international students who've arrived in Trondheim for the first time. They are a crucial stakeholder in this project, which is placed in the G1 category (high influence and high interest). If international students wouldn't take interest in the product, then we wouldn't have developed a product worth anything.

Can you describe or reflect on situations where learning was critical to the success of your project?

Early on in the project we decided that we wanted to create a product that benefits international students, since the majority of the group were studying abroad in Trondheim. In the modern day and era there's an app for everything, so naturally our thoughts drifted in that direction. Ethan had some app development experience from before, and took a closer look at what an app would mean in the context of our project. He argued that it was a lot of extra work to develop an app, and a website would accomplish the same result with only a fraction of the technical labor cost. Thus we decided to develop a website instead of an app.

When working on the content creation for the website, we had to learn how to divide the tasks evenly between us in a clear manner, so no overlap of work was done. Also the status of each task had to be known, so any team member could identify and take over any potential slack. As previously mentioned, Trello became the tool used to solve this.

What we need to unlearn

During the whole process of working on this project, the most important things that we needed to unlearn are:

- Perfectionism
- Over-confidence in the project planning - Individualism

These 3 traits/beliefs are very common in most people, but when working on a group project, they can make or break the success of the venture.

Can you describe or reflect on situations where unlearning was critical for the success of your project?

Unlearning perfectionism in this context refers to unlearning the fact that everything needs to be “perfect” or up to the standards of each member in order to be accepted. For instance, there were several moments where the team knew that the work produced was not optimal but moving on was essential to be able to finish in time. A specific situation would be the one described in the Introduction: we had to reassess the content and the target public in the middle of the project. Indeed, we decided to scrap some content (previously called “Before arrival”, “How to apply” and “Departure”). There were a few different reasons, the main one being that we ran out of time and had to either scramble to fill those sub-sections or deprioritize it.

This example also illustrates the second trait that we had to unlearn, which is overly trusting the project planning that we decided on in the beginning.

Finally, it has also been very important that each member does not display individualism and works as a team with everyone. This means trusting others to continue and share the work. In the beginning of the project the tasks were very separated, and thus the content lacked homogeneity (in the style and tone). Actively trying to come together and not work on the content as separated from the rest has been crucial.

Group

Not included 1. N/A

Group 27

5.1 Knowledge needed to meet the project's emerging needs and challenges

This project was for the entire team an important element in the construction and management of a project from start to finish, an essential element today as a project manager or for our future life as engineers. Throughout this period, we have learned to work as a team, to know how to listen to each other, to take everyone's opinions to progress. We have also acquired technical knowledge from an engineering point of view with sizing methods and software that were previously unknown to us. This learning (e.g. ASHES, INVENTOR) was carried out in self-training using different videos, test phases and allowed us to master the

software perfectly to master all the parameters. So we knew which parameter to modify to obtain this or that data in order to have the best possible yield. This allowed us to acquire autonomy, a certain rigor also because on such a meticulous project, no parameter can be left to chance. We have also worked on our ability to adapt to changes to be made in a relatively short time and the difficulties encountered for certain technical parts.

From the point of view of the knowledge acquired, we can mention project management, which is the essential element for the proper conduct of the project as well as the various management tools (WBS, PBS, Gantt, Risk Matrix, etc.). We also learned or deepened our knowledge of programming languages (Python and Excel) as well as different modeling software (ASHES and INVENTOR). We have acquired a lot of knowledge about the design and operation of wind turbines and learned to meet with practical challenges and consolidated our knowledge in thermal power and electromagnetism. From a practical point of view, at the end of the project we realized that we had acquired a certain autonomy in order to meet the deadlines and the various milestones that we had set on the Gantt chart.

All these elements allowed us to carry out this project that we particularly appreciated.

5.2 Unlearned elements during the project in order to manage emerging problems/questions and challenges

This part is more complex to answer because the project has brought us more than we unlearned. Nevertheless we can identify a few points.

At first, we were a group where no one knew each other, so we had to adapt and not impose our way

of managing a project as we were taught in our respective schools. Each teaching method is different and you have to adapt. It was quite beneficial to us in the end because it brought us more as a group because we were leaving on a neutral basis.

In a second time, for most of us our knowledge of electromagnetism went back 2 or 3 years and was therefore erroneous or forgotten. It was therefore necessary to relearn and review this information in order to be as accurate and accurate as possible from a technical point of view.

Group 29

4.2 Learning

The group is multidisciplinary and together has the technical knowledge that was needed to carry out the project. It was decided to use Microsoft Excel to make the product, which several team members had great knowledge and experience with. This made it easier for everyone to understand the product, how it was structured and how it works. The team member who was responsible for making the product, also had the opportunity to ask the group for help or assistance.

When carrying out a project, there is more knowledge needed than only the technical. It is important to know how to cooperate in the best way, which involves communication, finding the right person for the right role, and distributing tasks based on knowledge and expertise.

The group learned several things during the project, both about project management and knowledge that was acquired:

- It was important to have meetings every week at the same time. Everyone had different schedules, so the set meeting time made it possible for everyone to attend.
- Good communication is important when working as a team. Everyone encouraged the good conversation from the start by getting to know each other and allowing the conversation to slide over to something other than just the project.
- Icelandic Meteorological Office is the customer and main stakeholder of the project. The majority of the group did not have any prior knowledge of the institute, which was necessary to acquire in order to understand their needs and wishes, and develop the right product for them.
- Early in the planning phase, one project member became unavailable for a couple of weeks due to health reasons. The group therefore learned the importance of preparing for unforeseen events, and to not be too dependent on one specific person.
- While developing the product and seeing the output, everyone learned that digitization can contribute to increased security and efficiency.
- Early on the group created a preliminary project, which helped setting limitations early on in terms of time and resources. This taught the importance of setting limits to make a project realistic and achievable.

4.3 Unlearning

The whole project team has a technological study background. Team members have bachelor degrees from Mechanical Engineering, Renewable Energy, Electricity and Civil Engineering. This technological background turned out to be a bit challenging. In the beginning of the project, when the brainstorming

began, the team quickly ended up in discussing solutions on a low level. Instead of discussing the important topics on high level as what is the outcome, impact and benefits of the project, small parts of the ideas were discussed. These small parts should of course be discussed at a much later time. As a team we understood that we had to turn our minds around, and start thinking as project managers.

Gradually as the project manager mindset appeared, the project entered a better flow. The emerging problems were considered first from a high manager level, and then later taken down to a lower level when the technological solutions were about to be discussed. The project evolved more continuously, and project tasks were even dealt with more parallel. This made the project more efficient and structured.

The challenge described in this section got amplified as the team members were both managers and product developers. It was difficult not to think about detailed solutions, when that is what the team has been training for in recent years. Over all the challenge gave the project team a very valuable lesson, that will be taken further in the career. This lesson will probably give the next project one of the team members attend to a better start. It will be easier to find one's role and its tasks in the project management.

Group 30

Prior to the project, a list of required skills was created. The list included skills related to digital competence, marketing, project management and a deeper understanding of the market and users.

In retrospect, all of these skills were necessary to assure a product able to satisfy the customers. At the beginning of the project all members obtained information and knowledge about the needs of exchange students in Trondheim. Several members of the group were exchange students themselves, which gave valuable knowledge about user-needs. The previously mentioned survey strengthened our beliefs that there is a market for our product.

The graph below presents results from the survey and clearly shows that many students are struggling with certain processes prior to and after arrival. This contributed with an essential insight on how important the understanding of users needs are when developing a platform. Conducting surveys turned out to be a valuable tool to gain this relevant knowledge.

Another important aspect of the learning phase was related to the digital skills required to develop the website. The platform “wix.com” was utilized to simplify this process and leave more time for creative thinking. Implementation of information and design on the website was critical for the project success. Time was a constraining factor and resulted in a website that did not fully satisfy the initial expectations. However, the website is going to be modified and updated when user-reviews are gathered.

The marketing skills required for a successful project had to be acquired. The group discussed several options for marketing. Flyers, social media, NTNU website and other organizations were proposed. Realizing that this project must reach out to future students, knowledge had to be obtained about the habits of exchange students prior to their arrival in Trondheim. The survey helped to gain this information. Below are the responses and it clearly shows that the NTNU website was the best option to market the project. Unfortunately NTNU did not accept our request to market the website.

To ensure sustainability of the project, the Erasmus Student Network was contacted. The group had to acquire knowledge regarding the processes and routines of ESN. A critical

factor was to convince ESN that the website would contribute to a better experience for exchange students. After a promising initiation phase, ESN did not accept our request. This valuable lesson made us realize that in order for organizations to market external platforms, quality is crucial.

In order for the project to become successful, the unlearning and discarding of some beliefs was necessary. At the beginning of the project a detailed plan and time-schedule was put together. The intention was to follow this plan and keep track of time spent on each task. However, reality contains distractions and unexpected events that contribute to complexity in the project. All members of the group had to change according to this and re-prioritize the time needed for each task.

Group 34

This is a short list of attitudes, practices or knowledge we had to obtain to achieve our project goal:

- Programming languages python, HTML, React and JavaScript, as well as different frameworks such as flask.
- Web page design
- Logo design
- Project management theory
- Colour theory

The most evident parts of the project that required learning new things to overcome critical barriers, includes most of the programming aspects of the project. Programming in its nature requires a lot of new input and procedures that continuously has to be tested and built. This is not necessarily "brand new" information, "per se", but information that has to be exercised/made use of and customized to our specific project. Learning these new procedures was critical for the success of our project.

When designing a tool that both produces project plans and teach the user important lessons on the way, one definitely require a adequate grasp of the subject syllabus. Thus it was critical for us to learn project management definitions and project visual outcomes.

This is a short list of attitudes, practices or knowledge we had to discard to achieve our project goal:

- Procrastination
- Exchange student • Language

Projects where a product is developed can have a fairly tight time budget, and procrastination can be a major enemy to the desired outcome. We had to let go of the "old ways" of delaying the work to just before the deadline, and start working consistently throughout the project lifetime.

The group consisted of five Norwegians students, and one exchange student. The exchange student had to adept due to the different background compered to the NTNU students. The way of carrying out projects at NTNU is different from the exchange student's university in several ways, where the norm is purely theoretical projects. Therefore, the first thing that had to be unlearn was the predefined notion that theoretical projects are better than practical ones. The exchange student had never heard of Trello, Overleaf or Github, and quickly realized that they needed to unlearn their customs and adapt to the Norwegian way of working. Things such as their ordinary schedules had to be unlearned, as the exchange student was used to work and homework being done in the afternoon and evening, while these things are done before 4pm in Norway which felt uncommon. Even the way of communicating and sharing the progress of the project was different. The comfort zone had to be thrown away, going from using WhatsApp and Google Drive to Facebook and Messenger in order to communicate with the other team members.

As our group is multilingual, we had a language challenge. Most of the group was Norwegian, and would sometimes switch over to Norwegian without thought. This posed a problem for the exchange student, and could in worst case exclude the student from an important discussion. As English is not he mother tongue of anyone in the group this sometimes resulted in reduced ability to articulate oneself. However, this challenge can be

seen as an important learning opportunity, specially for the Norwegian group, as they should reflect around their responsibility and role in including foreign students and adjusting their way of working. This to achieve a working environment that feels welcoming and healthy for everyone, not only to the familiar NTNU students, which will be critical when leaving the university and joining the working force.

Group 38

● **Knowledge, practices or attitudes gained during the project**

During this project, we learned how to organise ourselves as a group in an efficient way: we needed to hold regular meetings in order to move the project forward. This was not easy, as we all had very different schedules, but setting up a solid organisation was the first and perhaps most important thing to do.

From an individual point of view, the knowledge acquired depends on the member.

Indeed, Denis and Thomas had knowledge of the construction sector and Antoine had some experience from an internship. However, the rest of the members had to read up and acquire some skills and knowledge necessary for this project.

This may sound trivial, but we also had to improve our English in order to write the documents and interview our interlocutors properly. For this we could rely on the stronger skills of some of the group members.

Of course, there was other knowledge and skills that had to be acquired for this project that we cannot remember or detail here.

It was also critical for the project to learn or at least to improve in video editing. Indeed, none of us had any real skills in this area. So we relied on online tutorials to help us gain this vital knowledge.

● **Attitudes, practices or knowledge discarded/found obsolete during the project** In order to carry out this project we also had to unlearn some knowledge or habits.

First of all, we had to unlearn some of the experiences of working in groups that we had had. Indeed, it is important to keep the organisational and communication skills acquired before, but each person in a group works differently. It was therefore important to adapt our knowledge in this area to each other's experiences in order to find the right compromise between the six of us.

When interviewing our construction contacts about security and digital, we also had to unlearn some things.

Denis led this exchange in the majority. He sometimes had to put aside his knowledge of this field to allow less directed questions to emerge and to be open to other types of answers than those he could foresee from his own experience.

Finally, we all had to unlearn our writing habits from our respective universities in France in order to meet the requirements of this assignment.

Group 39

Although we are students from different universities, we are nearly at the same point in our educational careers. During our studies in Mechanical Engineering, Industrial Engineering, and Computer Science, we learned a lot and have a lot left to learn. Based on the insights of the previous sections, the following points show what we learned and unlearned during the entire process of the project assignment.

Things we learned

- **Communication/Information is key**
Several decisions were made during the project, resulting in important information necessary to be shared with all group members. As a result, we established a group chat to ensure frequent information flow and project updates. Besides this online communication tool, we also held physical meetings on campus, where face-to-face communication could occur. These group meetings were valuable and necessary to create an arena for discussing project-related topics and solving unexpected issues. This communication is a crucial factor for the success of a project, as no critical information is overlooked or misinterpreted.
- **Schedule frequent meetings**
As we started our project assignment, we followed no strict meeting schedule due to contrasting lecture plans. As a result, the group struggled with communication problems that had to be solved urgently. Therefore, we agreed on weekly meetings to prevent miscommunication in the project team. It was also helpful to have short meetings, just for quick feedback and responses, when there was no possibility of meeting for a longer time. In addition, it contributed to our team building.
- **Soft skills are important**
We knew in the beginning that problems or conflicts could occur and that these problems would affect our project result. The importance of soft skills was demonstrated in our weekly meetings and collaboration sessions. A part of our project was to identify essential soft skills required by a project manager; problem-solving and teamwork are also skills that a good project manager should have or respectively learn.
- **Have a clear project organizational structure**
The course lectures reflect on the importance of a solid project organizational structure. In the early phase of the life cycle, we struggled to assign a structure as we were unsure if it was best to follow a functional or matrix structure. Finally, however, we structured our project to follow a matrix structure due to the slow decision-making process and silo mentality in a functional structure (B. Hussein 2018). After the planning phase, we realized the significant dependencies between tasks and decided to set deadlines for the different phases of the project. This helped us a lot, not only to see our progress but also to complete our tasks on time.

During this project assignment, one situation was critical for the success of the project:

Due to the initial lack of communication, our group faced a big misunderstanding regarding our product topic. Some group members thought we agreed on a project management tool where the project manager could evaluate their knowledge of project management. Other group members thought this tool was there to evaluate the project manager and their work by a second person. In retrospect, this misunderstanding was unexpected, but it would be critical to the success of our

project. This further proves the essential nature of communication and information as success factors in a project.

Things we unlearned

- Excessive discussion is good discussion
Discussions are healthy and necessary to reflect different angles of a project. However, these discussions can result in wasted time and resources. As our group had split into smaller subgroups, it was sometimes unnecessary for the entire group to be present in discussions if only a few felt they could contribute. At times, discussions became circular, with no apparent answer to the discussed question or indication of when the discussion had moved on.
- Updating the Resource chart is a waste of time
Due to our optimistic Gantt chart, the distribution of work was unequal as some tasks required much more time than initially planned. Consequently, there was little control over the efforts of the other subgroups. This could have been avoided by restructuring the Gantt chart to be more realistic for our project.
- It is best to only contribute to the sections you are most confident
Our project tactic was to split into subgroups to focus on the deliverables we could most strongly contribute. However, in hindsight, we could have exchanged competencies, where members could learn from one another and be able to contribute to other parts of the project. Although we felt our structure worked well, it did not allow us to learn as much from each other. Another criterion here is time; due to the project's due date, more time was required to realize this efficiently.
- Do the project only for a grade
After our studies and starting work life, we will no longer receive a grade or feedback on work. However, this project has given us insight into the challenges we will face when working on a project, in a team, and in a specific role. It is clear that we have to find an alternative form of motivation to work towards a successful outcome in the future. Therefore, for this project, we have unlearned motivation to complete a project only due to a grade.

In contrast to the critical situation in the "what we learned" part, we had no situation where unlearning was critical for the project's success. However, the points mentioned in unlearning increased the project's workload, uncertainty, and required effort. For example, the mentality "Excessive discussion is good discussion" leads to unawareness, which occasionally does not allow us to be open to new information (Raelin 2001). This can be the source of conflict due to inadequate discussion and poor group dynamics. Therefore, the points mentioned in unlearning are essential, as they can result in significant conflicts and problems that can cause project failure.

Group 40

For this project, the main task was to make the GløsHappening website functional and interactive for all users. Creating a website is not easy, as it requires a great level of programming skills. At first, we tried to make the website using other tools that helped creating websites easily, to avoid having to program it from scratch. We then realized that the functionalities we wanted to implement, such as creating accounts or having an interactive and editable map for the user, were not possible without programming on our own. Luckily, one of us had experience in this kind of tasks and it has made everything easier. In turn, the

rest of us have learned basic notions of web programming both by looking for different ways to do the project and by looking at the code written by our partner. Nowadays programming is found in all kinds of projects, so this knowledge will be of great help in future projects during our professional career.

As for teamwork, as in all the projects in which we have been and will be involved, we must communicate with each other and work together to carry out the work in the best possible way. At the same time, the fact that we are a team made up of students from different parts of the world has helped us to improve our communication in a common language, English.

Moreover, the only previous idea we had about creating websites was that we could do it without programming, through other tools created by other people. However, as we have already mentioned, the functionalities we wanted to implement in our website were too complex to be done through a tool available on the internet. When we realized that we had to program the website from scratch in languages such as Python, HTML or JavaScript, we didn't know if we would have time to finish it as only one of us knew how to program and the rest of us had to learn in record time. This has helped us to know that projects don't turn out as we initially planned them, as what seemed easy to do in our heads, has a complexity behind it that we don't realize its magnitude until we really get to work on it. Realizing these details and correcting them in time is part of the process, both for the project in question and as a learning process for future work.

Group 41

Learn

The project objective was to create a website containing information about the cheapest prices of different bars, are these the skills that were the most important for the project's success:

- - Programming: The product from the project is a website, so programming is by far the most important skill to create the product. Two students in the group had some experience in the field, so they naturally became responsible for the production part of the project
- - Law: Finding the line between informing and advertising the prices of alcohol was essential for the project to be successful, since advertising for alcohol is strictly illegal, but informing people about their prices is legal. No one in the group had a particularly greater knowledge about law than the others, so finding this out was assigned rather randomly. Information about this topic is easily available, but the line between advertising and informing is not always so clear
- - Information gathering: Information gathering was a big part of the project, as the information gathered is the selling point of the project. The methods used to gather information is explained above, but there are a lot of different skills required for the information gathering to be successful. You must be precise with your language to show seriousness and professionalism, you need to know where you must go to get the information and you have to be great at communicating in case of more information or other requests.

Unlearn

One of the things that had to be unlearned was prejudices. The group consisted of five people taking master's in project management, and one taking master's in chemical engineering. The last one had prejudices regarding being excluded by the others, such that the dynamic in the group would be chaotic. Some of the group members also thought that the one with chemistry background could not develop a website since she was not a data engineer. Starting a project with negative thoughts about the members can affect the success of the project. This is something the group members had to unlearn in order to have good teamwork.

Random Group 1

6.1 What we learned during the project New technologies

One of the great skills that we have obtained in this project is the ability to analyze, synthesize and disseminate information through new technologies :

1. Video editing: Although this field is a little far from the knowledge that we acquire throughout the degree, it can be a good tool for the future when we want to communicate information about the projects that we will develop throughout our working life.
2. Launching multimedia content on different platforms/social networks: This is another great tool that together with the previous point can help us to make ourselves known so that our work can be recognized around the world.
3. Creation and configuration of a form to collect data and improve our project: One of the most valuable lessons we have learned is the great value of data. Such as collecting information that would tell us what content would benefit our final product the most: If we showed images of what students who want to do an academic exchange in the city of Trondheim are most interested in, our video could become more viral and reach more people who might not have as a first choice to study in Norway. In this way we would be maximizing the options to promote NTNU and all that it encompasses.

From the form, we have obtained valuable information that we have been able to use to subsequently create the appropriate content for the users. The conclusions we can draw from the above graphs is that more than 60% of the respondents have ever received a promotional video from NTNU or Trondheim (Figure 10) and also the level of satisfaction of these is high (Figure 11), as no one has voted a value lower than four in the scores.

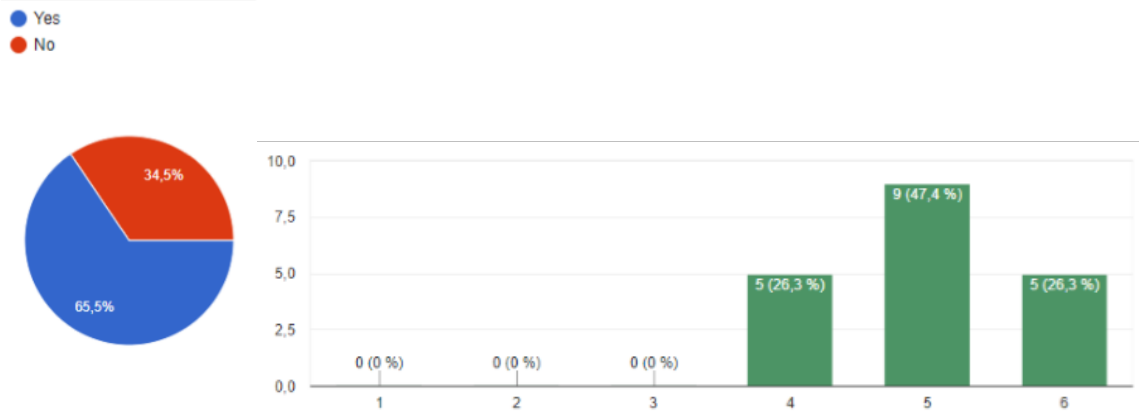
Figure 10: proportion of respondents who saw the promotional video Figure 11: Level of satisfaction of the video 13

In the Figure 12 we can see that users consider content related to student life, student organizations and tourism to be of greater importance. However, not much content about the native language of the country is expected to appear.

Figure 12: Content preference Norwegian culture

As a side effect, we got to know part of the Norwegian culture, places and traditions. After all, the group is mostly composed of academic exchange students and therefore we did not

have so much information about the city of Trondheim and the country it belongs to. Therefore, we had to soak up everything that surrounds Norwegian culture in order to offer the best possible result when shooting the videos for the final product.



6.2 What we had to unlearn

1. Advance alone in the project. The fact that each member of our group comes from a completely different study program has been a strength for the group but also a weakness. Indeed, during our first meetings, which consisted of defining our project and the means to be put in place to achieve its success, it seemed obvious to us that the best way to proceed was to divide the project into distinct tasks to be carried out. Each member would then have an assigned task that best corresponds to his or her field of study and that would be it. However, this method was not very effective because each member was working alone on his or her part of the project; teamwork was therefore neglected. For the rest of the work, members had to unlearn the practice of working alone on their assigned part of the work.

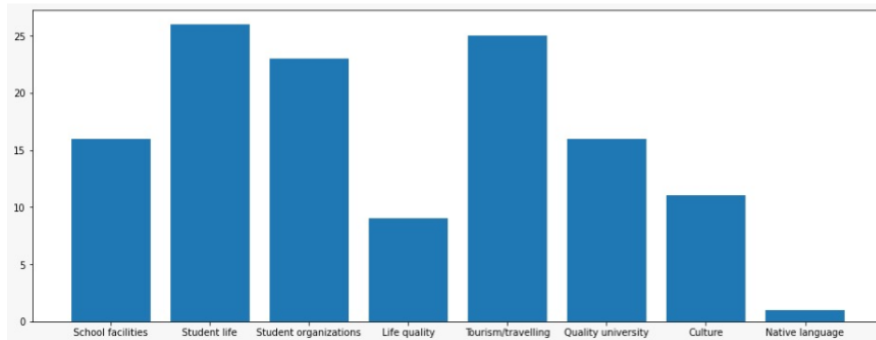
Instead, we implemented a collaborative system where each member of the team read the work done by his or her colleagues in order to provide feedback in writing or at the next meeting. In addition, instead of breaking the project down into smaller parts to be completed by one member of the group, we divided the project into larger tasks to be completed collaboratively by several group members.

2. Avoid confrontation. A group where everyone always agrees seems to be the best thing for a work. This is not always really the case. Indeed, the confrontation of members' opinions can be beneficial for the whole group. So we had to unlearn this attitude of avoiding confrontation.

At the beginning of the project, the associates were mainly learning to know each other better, to set the first objectives necessary for the good realization of the work, but the members did not really find their place in the group yet and did not dare to confront their opinions. The group then went through the phase of confrontation of ideas where it was possible to perceive the real expectations and personalities of the members. This stage was however very positive for the team, which was able to better clarify which role was best suited to which member and, above all, it allowed for a surge of creativity thanks to the sharing of knowledge by everyone.

3. Do things at the last minute. Our group was one of the last to be set up, which did not leave us much time to meet the first deadline (the submission of the pre-report). Taking it at the last

minute does not allow for good communication between team members and does not allow for quality work. Since then, thanks to a good division of tasks, respect of the schedule and efficient communication, we have always managed to stay on time for our work.



Random Group 4

This project is the first project that we have done with this amount of project management skills and knowledge. This has obviously given some reflections on the project work, and the lessons learned will be presented in this section. It will focus on the knowledge, practices and attitudes that we have gained during working on our project.

What did we need to learn:

- Use the management tools in practice and not only theory.
 - To focus on the objects in the critical path.
 - Learn tools to build our website.
 - Communication with other nationalities.
 - Gather knowledge from a lot of people in a short time.
 - Do risk assessment and plan for uncertainties.

Where learning was critical:

A lot of the important things we learned during our project has influenced how well our project ended up being. One of the main things that were crucial to our work was to do a good risk assessment as well as finding the uncertainties which could have a huge impact on our project. By addressing these early we were able to remove the uncertainties which allowed the process to go smoothly. We also talked about the critical path all the time to make sure we did allocate our resources to the right tasks. One of the hold backs we made sure to encounter in the beginning was the lack of knowledge about building a website. The early addressing made it possible to learn the important things early and thereby ensure the end product was realistic.

What did we need to unlearn:

To go with the flow of the project - but instead plan ahead To believe people will do work and participate by themselves

In our previous projects we did not do the amount of planning we did in this project. We had to plan instead of just going with the flow as we were used to. When tasks on the critical path

needed to be done this had to be the focus regardless of how fun one or another's tasks were. We also encountered a problem with two team members in the first part of the project. These two did not participate in the group meetings but to include them we did contact them. This resulted in us moving the meeting such that everyone could attend only to be disappointed about a no show from the two others. In the planning we did plan for being 5 members. We have always worked with groups that were engaged in the different projects we were working on, and therefore we tried over several weeks to include the other two members. All our work to bring the guys into the group ended up being worthless as both the guys did not finish the course. Here we learned the hard way that we can not just anticipate people to be engaged and work on the project. When planning and working you have to plan for the things that are certain and not just how you would like it to be.

Group 0000

1. Læring

I prosjektet var det mange aspekter ved å lage en app som gruppen ikke hadde kunnskap om, eller ikke var forberedt på. De viktigste erfaringene er som følger:

- Å produsere og ferdigstille en app er tidkrevende og krever god kunnskap og gode ferdigheter
- Møter med profesjonelle aktører ga oss flere erfaringer
- Forberedelse til møter er viktig for å få maksimalt ut av møtene
- Interessentene vi ønsket å kontakte, prioriterte ikke alltid våre henvendelser

Den første og trolig viktigste erfaringen gruppen gjorde, var vanskeligheten ved å planlegge et prosjekt der man har lite kunnskap om de tekniske detaljene rundt skapelsen av produktet. Dette reflekteres gjennom vårt uferdige produkt. Vi oppdaget relativt tidlig at den opprinnelige planen var for ambisiøs. Prosjektet er derfor en god erfaring i å håndtere endringer, og ikke lykkes slik man først hadde tenkt.

I begynnelsen av prosjektet var gruppen noe usikre på hvordan prosjektet skulle gjennomføres. Dette førte til at gruppen valgte å prøve seg litt frem, og fremgangsmåten ble endret noe underveis. Det ble brukt mye tid på markedsundersøkelser både mot brukermarkedet, men også mot samarbeidspartnere. Gjennom møter med aktører som Trøndelag Fylkeskommune og SiT opplevde gruppen at man burde forberedt seg på en annen måte, slik at vi hadde fått mer detaljer rundt det vi ønsket å få ut av møtet. En direkte læring av dette er å etablere intervjulogger og et sett faste spørsmål, som man kan sende ut til intervjuobjekt før møte. Slik blir begge parter bedre forberedt før møtet. Brukerundersøkelsene lærte oss også at det kan være stor variasjon i hva produsenten og brukerne mener er et godt produkt.

2. Endringer og avlæring

Selvstendige arbeidsmetoder og utnyttelse av gruppens kapasitet

I starten av semesteret tenkte vi at det ville være enkelt å utføre et prosjekt med 8-10 personer. Ettersom vi har flere ulike fag, viste det seg å være vanskelig å finne tidsrom der

alle var tilgjengelig. Dette gjorde det vanskelig å delegere oppgaver og sørge for at alle fikk noe å gjøre fremover. I tillegg hadde enkelte av gruppemedlemmene jobbet en del selvstendig og tok egne beslutninger uten å kommunisere med andre. Dette skapte problemer for gruppen ettersom enkelte medlemmer endret på deler av oppgaven uten å kommunisere det videre til resten av gruppen. Gruppemedlemmene måtte avlære denne selvstendige arbeidsmetoden, og utnytte gruppens kapasitet for å komme i mål med oppgaven.

Utvikle app i tverrfaglige grupper

I starten av prosjektet trodde vi at det skulle være relativt greit å utvikle en app som fungerte og kunne tas i bruk. Dette viste seg å være feil og vi endte opp med å måtte endre målsettingen fra å skulle utvikle en app til å lage en god prototype vi kunne jobbe videre med. Det å utvikle en app viste seg også å koste mer tid og ressurser enn hva vi først trodde. Ettersom alle medlemmene i gruppen går samme studie og har gjennom sine år på NTNU lært mye av det samme, så hadde vi ingen erfaring med å lage en app. Gruppen måtte avlære tankegangen om å jobbe i en gruppe med kun en fagdisiplin, noe som burde vært gjort fra begynnelsen av prosjektet.

Group 0003

Refleksjon over læring og avlæring

Gjennom hele prosessen med prosjektoppgaven vår har vi støtt på flere utfordringer. For å håndtere ulike utfordringer i prosjektet, måtte vi lære og avlære en rekke kunnskaper, praksiser og holdninger. Noen av de viktigste læringsmomentene oppnådd gjennom prosjektet inkluderer:

Læring

1. Det var viktig å lære seg og bli kjent med hverandre, slik at vi ikke begrenset kreativiteten og muligheten for å stille kritiske spørsmål. Begrensene faktorer her erfarte vi var hovedsakelig sjenanse og høflighet.
2. For å sette møtetid måtte vi lære oss å være mer tilpassningsdyktig enn tidligere prosjekter. Dette var fordi de fleste hadde ulik timeplan og forskjellige prioriteringer.
3. Vi måtte få innsikt i prosjektstyring og planlegging som var tilpasset produktet vårt. Dette hadde vi ingen relevant erfaring med fra før. Vi har måttet lære hvordan man bryter en oppgave ned i mindre arbeidspakker. Dette for å kunne delegere oppgaver, øke effektivitet og redusere stress. Et annet eksempel er viktigheten av å skille samarbeid og samhandling. Vi måtte lære å bedre utnytte hverandres styrker og kompetanse.

4. Vi har lært om hvordan gjenbruk av materialer kan redusere miljøbelastningen fra klær og tilbehør. Videre har vi fått innsikt i vannavstøtende tekstiler og hvordan de kan redesignes om til vårt produkt jThe Crownk.

Avlæring

1. Fra tidligere prosjekter er medlemmene vant til egne strukturer og form for kommunikasjon, fordi man som oftest kjenner hele gruppene fra før. Vi måtte derfor endre vår tilnærming til prosjektorganisering og arbeidsdeling for å håndtere utfordringene som oppsto underveis og forbedre samarbeidet i gruppen. Vi har fått avlære at en gruppedynamikk ikke er direkte overførbart til en annen.
2. Vi måtte forkaste gamle holdninger og antakelser og lært viktigheten av statistikk og markedsundersøkelser utover egen oppfatning. Vi har dermed fått utfordre våre egne ideer om hva som er moderne og stilfullt. å undersøke flere perspektiver samt lytte til ulike meninger har vært sentralt for å danne et mer helhetlig inntrykk av mote og stil.
3. Vi har fått avlære tidligere holdninger om at produktutvikling var ganske uoppløselig. Vi er farte at med samarbeid, sammenlagte forkunnskaper og veiledning fra emneansvarlig kunne vi gjennomføre dette prosjektet.
4. Noen av gruppe medlemmene foretrakk å bruke Microsoft Word i Teams for å jobbe sammen, men underveis i prosjektet gikk vi over til å bruke LaTeX i Overleaf. Samtlige måtte lære å bruke denne teksteditoren. Enten fra bunnen av, eller videre bygget på tidligere forkunnskaper.

Samlet sett har denne prosjektoppgaven vært en verdifull læringsopplevelse som har utfordret oss til å vokse både personlig og profesjonelt. Vi har lært mye om bærekraft, gjenbruk og motetrender, samt flere aspekter ved prosjektledelse og prosjektstruktur. Videre har vi også avlært tidligere holdninger og praksiser som ikke lenger var hjelpsomme eller relevante.

Group 0008

De viktigste lærdommene fra prosjektet

Basert på gruppens erfaring, kan det gis flere entydige råd til andre studenter om hvordan det kan jobbes med lignende prosjekter.

1. Det vil være gunstig å først identifisere læringsmålene for sluttproduktet før det blir bestemt hvilken oppgave gruppen velger og hva sluttproduktet skal være. På denne måten vil gruppen spare tid, og dermed unngå ekstraarbeid som kan oppstå dersom en velger et produkt som ikke tilfredsstillende alle læringsmålene for faget.
2. I startfasen av prosjektet er det lurt å gjennomføre en idémyldring der en foreslår alle mulige ideer det er interesse for å jobbe med. Dette kan gjøre at det tidlig oppdages eventuelle problemer og mangler, samt at gruppen får inspirasjon til nye ideer. Ved hjelp av denne prosessen vil det være lavere terskel for å kunne si sin mening. Dette er essensielt da enkelte kan sitte med viktige poeng, som vil hjelpe gruppen videre. I tillegg er det enklere å dekke alle avgjørende faktorer ved prosjektet som en gruppe enn alene. Gruppemedlemmene må også kunne ta imot konstruktiv kritikk fra hverandre og inngå kompromisser, slik at verdifull tid ikke kastes bort på unødvendige konflikter. Det er likevel viktig å gi hverandre ros og anerkjenne hverandres arbeid for å forhindre at motivasjonen i gruppen svekkes. En god arbeidsfordeling er også avgjørende for fremgangen i prosjektet. Det må være mulig for medlemmene å kunne si fra og føle seg hørt dersom de føler de har blitt tildelt mer enn de kan gjennomføre. Da ideen må funke både teoretisk og i praksis er det viktig med en reell forretningsidé. Det er derfor viktig at det gis rom til forbedring og videreutvikling av både produktet og gruppedynamikken.
3. Et annet råd er å ha veiledere som er tilgjengelige gjennom prosjektet. Foreleser i faget er til god hjelp og kan følge opp tett gjennom semesteret. Andre personer/bedrifter med prosjektledelseserfaring er også positivt for å få flere perspektiver med i prosjektet. Det å kunne stille spørsmål til noen konkrete personer når man er usikker har gruppen erfart er svært nyttig for å opprettholde fremgang i prosjektet.
4. Et til råd er å være fleksibel og løsningsorientert. Kanskje produktet og veien til produktet ikke blir helt sånn som gruppen så det for seg i starten. Det er fint hvis gruppen er forberedt på dette når man starter prosjektet, da kan man minske skuffelser og dermed også forhindre at mye motivasjon mistes.
5. I prosjekter hvor mange skal samarbeide er det viktig å lage en god organiseringstruktur tidlig. Det å ha tydelige forretningskrav og regler er avgjørende for å danne en felles visjon for prosjektet. Gruppen har gjort seg gode erfaringer om hvordan det er å arbeide sammen i et prosjekt. Mange av medlemmene hadde lite

erfaring med slike store gruppeprosjekter i tillegg til at det kan være krevende å koordinere åtte ulike meninger og perspektiver. Det ble erfart hvor enkelt det kan være å fraskrive seg ansvar når man er så stor gruppe.

6. Det å være åpen for nye perspektiver er en viktig felles egenskap gruppen bør ha. Det er betryggende når noen støtter ideen din, men uten konstruktiv kritikk er det lite rom for å forbedre ideen. Konstruktive tilbakemeldinger gir mulighet for å utvikle ideen og la den vokse i ulike retninger. Dette er viktig for å opprettholde interessen når produktet har nådd markedet.
7. Før gruppen startet å skrive rapporten, ble det utarbeidet en felles disposisjon. I plenum gikk gruppen gjennom hva som skulle inkluderes i hver del. Dette førte til enighet om forventninger og innhold i teksten, som gjorde det enklere å starte rapport skrivingen. Dermed anser gruppen denne fremgangsmåten som en suksess.

Group 0013

Refleksjon over læring og avlæring

I løpet av dette prosjektet har det vært flere tilfeller hvor gruppemedlemmene har vært nødt til å bli lært nye ting, men samtidig legge vekk gamle uvaner eller endre måten man tidligere har gjort ting på for å tilpasse seg gruppedynamikken. Nedenfor nevnes en rekke nye ting som ble lært og uvaner som ble lagt vekk underveis i samarbeidet.

Opprettelse av spørreskjema

Som del av opprettelsen av spørreskjemaet tilsendt bedriftene, måtte spørsmålene naturligvis sammenfattes basert på informasjonen innhentet i forkant. En stor del av informasjonsinnhentingene baserte seg på sortering av relevant og urelevant informasjon, samt tilpassing av informasjon for å passe problemstillingen. Vi måtte derfor tilegne oss generell kunnskap om temaet for å kunne stille gode og relevante spørsmål til firmaene som deltok. Dette klarte vi, og svarene var stort sett som forventet. Undersøkelsen fungerte dermed som en bekreftelse på litteraturstudien, med individuell variasjon fra de ulike firmaene. Vi lærte derfor at bakgrunnen for et vellykket spørreskjema er detaljert kunnskap på forhånd.

Fordeling av oppgaver innad i gruppen

Så langt i studiet har man jobbet med personer vi kjenner fra før. Oppgavefordelingen blir lettere når man kjenner hverandres styrker og svakheter. I dette prosjektet jobbet alle medlemmene med noen ukjente personer. Oppgavene ble fordelt fortløpende gjennom prosjektet, og alle ble enige om oppgavefordelingen. Det var avgjørende for prosjektet at medlemmene tilpasset seg hverandre, og aksepterte arbeidsfordelingen. Dette var også svært viktig for opprettholdelse av firstene. Som nevnt under punktet ”Alternative effektiviseringsmetoder” i seksjon 4, kunne det vært fordelaktig å undersøkt hver enkelts egenskaper på forhånd av arbeidet, for så å delegerer oppgaver utifra resultatet. Fremgangsmåten for utdeling av oppgaver var heller tilknyttet hvem som var tilstede på gruppemøtene, samt hvem som hadde tid nok til å utføre oppgaven.

Planlegge hverdagen

I en stor gruppe på åtte personer, der alle har ulik timeplan, blir opprettelse av fast møtetidspunkt ofte problematisk. Ofte opplevde gruppen at annen undervisning eller jobb kolliderte med møtetidspunktet, som resulterte i mangelfullt oppmøte. Hvert gruppe medlem måtte derfor lære seg å planlegge tidsbruken basert på de andre gruppe medlemmene, fremfor å kun ta hensyn til seg selv. Denne lærdommen var avgjørende for godt samarbeid og kommunikasjon i gruppen.

Halve gruppen hadde aldri brukt LaTeX før

Halvparten av gruppe medlemmene hadde aldri benyttet skriveverktøyet LaTeX tidligere, mens de resterende medlemmene hadde ganske god erfaring med LaTeX. Gruppen kom fort til enighet om at LaTeX skulle benyttes, basert på den felles enighet om at problemer kunne oppstå. Halvparten av gruppen måtte basert på dette lære seg LaTeX, slik at oppgaveskrivingen skulle gå smertefritt. Selv om flere av medlemmene hadde god erfaring med LaTeX, var fortsatt feilkoder tilknyttet kilder og strukturering av tekst tilstedeværende, samt problemer med å legge til vedlegg.

Group 0014

Lærdomsrefleksjon

Tilegnet læring

Under er det listet opp kunnskap, metoder og erfaringer gruppen måtte lære for å ta hensyn til utfordringer i prosjektet etterfulgt av en refleksjon av når læring var kritisk for suksess.

- Bygge et sammensveiset og godt team som trives og ønsker å gjøre hverandre gode.
- Være aktiv i kommunikasjonskanalene og gi feedback hvis det blir etterspurt. Når alle er med og hjelper hverandre skaper det et bedre prosjekt, i tillegg til at det gir et bedre overblikk.
- Tidlig opprette prosjektplan med oversikt over prosjektets livsløp og beslutningspunkter. Dette ga god overordnet oversikt og prosjektet fikk tydlige deadlines som sikret progresjon. Planlegging ble også vesentlige ledd når prosjektet var delt opp i mindre faser.
- Ha god struktur og sette faste møtetidspunkter.
- Bruke spørreundersøkelser for å nå ut til interessentene.
- Opprette nettsiden.

Den største utfordringen med prosjektet har vært å lære hvordan man lager en nettside som skal være funksjonell, samtidig som den er lett og rask å bruke. Det var helt kritisk å være tidlig ute med å skaffe mest mulig kunnskap og erfaring gjennom opplæring, prøving og feiling. Det finnes utdanninger på bachelor og master nivå innen webdesign og UX design, så det ble en bratt læringskurve. Vi har blant annet vært i kontakt med Hyper Island i Karlskrona og Olavstoppen AS for å utforme nettsiden. Hvis den tekniske delen hadde vist seg å være for komplisert å gjennomføre på egenhånd, måtte vi enten ha leid inn ekspertise eller avslutte prosjektet og starte på et nytt. Skulle vi ha leid inn profesjonell hjelp fra et selskap ville det ha kostet og det var heller ikke satt av penger til å utvikle prototypen. Fordelen med at alle i gruppa går på NTNU er at det er mange andre kyndige studenter som kunne ha vært aktuelt å ha med i utviklingen av produktet. Dette er også en grunn til at vi følte oss komfortable med å gjennomføre prosjektet.

Som tidligere nevnt var planen å ha faste torsdagsmøter for å blant annet samle alle og følge opp progresjonen. Etter hvert ble det mer uregelmessige møtetidspunkter og færre som kunne møte opp. Dette fikk konsekvenser for prosjektet, så det ble kritisk å gjøre endringer for at

prosjektet skulle komme i mål. God kommunikasjon er alfa omega, men det blir med en gang mer utfordrende når man ikke er samlet fysisk og får diskutert. Vi fikk testet å holde et møte hvor to i gruppen var til stede over teams. Dette bydde på flere utfordringer som ikke hadde oppstått hvis alle var samlet. Blant annet er teams-samtalen litt på etterskudd som fører til at man ofte ender opp med å snakke i munnen på hverandre. Erfaringen var at det da var lett å bli mer passiv. Det blir også vanskeligere å vise hva man mener når man ikke får brukt kroppsspråket. Det oppstod frustrasjon og det ble tydelig at forsøket ikke var spesielt vellykket. I tilfellene hvor det var dårlig oppmøte ble det heller ikke alltid viderefremidlet hva som ble diskutert eller avgjort som igjen viser hvor viktig det er å ha et referat fra møtene. Vi konkluderte med at faste torsdagsmøter skulle gjeninnføres og man skulle etterstrebe å møte opp. Fast struktur og forutsigbarhet ga resultater og var i all høyeste grad med for at vi kunne lykkes med prosjektet.

Nødvendig avlæring

Under er det satt opp en punkter over hva gruppen måtte avlære for å ta hensyn til utfordringer i prosjektet, etterfulgt av en refleksjon om når avlæring var kritisk for suksess.

- Det at gruppemedlemmene kjente hverandre fra før førte til konfliktskyhet som det var avgjørende å avlære for å ta de vanskelige samtalene og sørge for at alle jobbet tilstrekkelig med prosjektet.
- Selv om ingen hadde erfaring fra liknende prosjekter var det tydelig at enkelte tok mer plass som måtte tilpasse seg for at alle skulle få sagt sin mening og bli lyttet til.
- Silotenking var nødvendig å avlære for alle i teamet, som tidligere nevnt. Det var fort at fokuset hos hver enkelt skiftet over til å kun se på sin egen del av prosjektet.
- Mangel på fleksibilitet.

Siden det er viktig å opprettholde det gode arbeidsmiljøet vi hadde i gruppen var det utfordrende å ta opp saker som kunne påvirke dette. Tidlig i prosjektet var enkelte i teamet mindre effektive enn andre. Det var noe misnøye rundt dette, men det ble ikke tatt opp verken direkte til dem eller i plenum. Denne misnøyen gikk sannsynligvis utover moralen og effektiviteten på et tidspunkt. Løsningen ble at to i gruppen tokk initiativ til å samle resten og snakke gjennom situasjonen. I etterkant av dette møte ble det lettere å gi konstruktiv kritikk og saker ble tatt opp tidlig så det ikke utviklet seg. Erfaringen gjorde at det ble lettere å

håndtere slike problemer videre i prosjektet. Konfliktskyhet ble en kritisk avlæring og noe vi vil unngå å ta med inn i fremtidige prosjekter og arbeidsliv.

Group 0017

Refleksjoner om læring og avlæring

Undersøkelsen vår om språkproblematikk bød på en rekke hindringer og utfordringer. Gruppen tilegnet seg ny kunnskap og nye ferdigheter, men var også nødt til å avlære forutinntatte holdninger. Punktene er basert på det gruppen anser som de viktigste lærdommene og avlæringene fra prosjektarbeidet.

Læring:

- **Prosjektnedbrytningsstruktur**

Til tross for at gruppen har mye erfaring med tidligere gruppearbeid, oppsto det noen utfordringer rundt det. I hovedsak var det to faktorer som bidro til utfordringen; gruppens størrelse og prosjektets kompleksitet. Tidligere har vi vært vant med gruppearbeid med 3 eller 4 personer per gruppe, i motsetning til dette prosjektet der vi har vært 6 personer.

Kompleksiteten til prosjektet utfordret også samarbeidsevnen. Prosjektet besto av arbeidsoppgaver sterkt avhengig av hverandre. Et eksempel på dette var at man ikke kunne sende ut spørreundersøkelsen før den var laget. Vi trengte derfor gode måter å organisere arbeidsprosessen på, slik at vi kunne samkjøre forskjellige ledd av prosjektet. Dette gjorde vi ved å lage en projektnedbrytningsstruktur (WBS), der vi enkelt kunne sette ansvar og frister til hver arbeidspakke (Hussein, 2016, s. 68). På denne måten hindret man å måtte vente på hverandre, og kunne utføre arbeidsoppgaver parallelt. Å bryte ned det komplekse prosjektet og fordele arbeidspakker på en effektiv måte var kritisk for prosjektets suksess.

- **Microsoft Teams**

En annen ferdighet vi fikk fra prosjektet var evnen til å bruke Microsoft Teams på en smart måte. Ved etableringen av kommunikasjonsplanen i for-rapporten ble gruppen enige om å bruke Teams til fildeling, intervjuer, ekstraordinære møter og raske spørsmål, eller kommentarer til resten av gruppen. Vi valgte å bruke Teams til dette, til tross for at gruppen hadde liten erfaring med programvaren. Som nevnt tidligere opplevde gruppen noen

utfordringer med Teams. Selv om bruken av Teams ikke var det mest effektive for gruppen, lærte alle å benytte en plattform som brukes mye i arbeidslivet.

- Forståelse for byggebransjen

Gjennom prosjektets arbeid har vi vært nødt til å lære mer om byggebransjen, spesielt bemanningsaspektet. For å nå frem til målgruppen for undersøkelsen måtte vi sette oss inn i samspillet mellom entreprenører, bemanningsbyråer og fagarbeidere. Denne kunnskapen hjalp oss nå frem til fagarbeiderne, og var dermed kritisk for suksessen til prosjektet.

Avlæring:

- Legge fra gruppens egne tanker og teorier

Før arbeidsprosessen kunne starte måtte vi legge fra oss tidligere erfaringer og teorier rundt temaet. For å oppnå et godt resultat var det ønskelig med en objektiv tolkning av svarene fra spørreundersøkelsen. Gruppens egne erfaringer samsvarer ikke nødvendigvis med realiteten.

- Legge fra seg personlige meninger

Egne meninger og synspunkter er ikke nødvendigvis de mest korrekte. Gjennom diskusjon bestemte gruppen seg for hvordan vi ønsket å løse oppgaven. Det var tidvis uenigheter rundt valg som ble gjort, og det ble derfor viktig å se ting fra flere perspektiver. Dersom gruppen ble enig om noe i fellesskap, var det viktig å legge fra seg egne meninger.

Group 0019

Refleksjon av læring og avlæring

Tilegnet læring for håndtering av utfordringer og behov i prosjektet

- Skaffe god innsikt i hvordan man motiverer teammedlemmer og hvordan man arbeider effektivt sammen.
- Få gode kommunikasjonsferdigheter både innad i prosjektorganisasjonen, men også ut til de ulike interessentene.
- Ha en god praksis når det gjelder prosjektledelse, slik at prosessen knyttet til planlegging og organisering blir så effektiv som mulig.

- En innovativ praksis i tidlig fase var avgjørende for å avdekke behov og hvordan man kunne innfri disse behovene.
- Kunnskap om hvordan utføre risikohåndtering var svært viktig med tanke på utfordringer i prosjektet.
- Markedskunnskap og hvilke holdninger og praksis man burde ha når man kontakter det relevante markedet.
- Tydelige målsettinger for selve prosjektet og alle involverte, og på den måten vil det være lettere å lede prosjektet i riktig retning og måle fremgangen.
- Ha et godt samarbeid mellom alle som deltar i prosjektet, både ved å dele kunnskap/tilbake- meldinger og kunne motta det på en god måte.

Videre refleksjon rundt konkrete situasjoner hvor læring var avgjørende for prosjektets suksess. Først og fremst viste det seg tidlig at både god kommunikasjon og tydelige målsettinger var helt avgjørende for suksessen til prosjektet. I oppstartsfasen opplevde vi at målsettingene ikke var spikret, og dermed heller ikke omfanget av prosjektet. Dette førte til at fremgangen gikk tregt og at det ikke var en felles forståelse for hva gruppen ønsket å oppnå. Kommunikasjonen var til- stede, men den var ikke god nok og førte oss ikke effektivt fremover. Grunnen til det var at vi manglet klare og tydelige prosjektmål. Ved å få på plass disse prosjektmålene opplevde vi med en gang at kommunikasjonen og samarbeidet i gruppen ble bedre.

En annen veldig viktig læring har vært knyttet til GDPR-problematikk. Med dette menes hvor kritisk vi fant ut at denne lovgivningen er for prosjektet vårt. I starten av prosessen tenkte vi at det var mulig å spore enkeltpersoner med navn og stillingsinformasjon, slik at en lett kan finne frem til riktig person på byggeplass. Dette er et eksempel på en av tingene som viste seg å være ulovlig og det var derfor helt avgjørende å lære om dette for suksessen til prosjektet. Når vi inn- så dette forstod vi også at det var nødvendig med hjelp fra en ekspert på GDPR og personvern. På denne måten fikk vi etablert tilstrekkelige systemer og sikkerhetsrutiner, og unngikk å havne i trøbbel med tanke på behandling, innsamling og lagring av persondata.

Til slutt vil vi nevne en utfordring vi møtte på som også ble lærerik. Dette var hvordan vi på best mulig måte skulle klare å jobbe med så mange prosjekter gående samtidig. Medlemmene i gruppen har flere andre prosjekter som også måtte prioriteres. I starten av semesteret var det

derfor mye kaos og lite oversikt. Dette svekket progresjonen svært mye og vi måtte derfor sette i gang tiltak for å endre dette og håndtere stresset på en bedre måte. Det første vi gjorde var å legge en strukturert plan som var tilpasset hvert enkelt medlem, basert på valg av fag og tidsfrister for innleveringer. Overordnet for dette tok vi også i bruk en hovedfremdriftsplan som gjaldt for alle. Møtetidspunktene ble også satt til to ganger i uken slik at vi sikret deltagelse fra alle. Delegering av oppgaver tidlig ble også sentralt, slik at det ble lettere å være fleksibel og at alle var klar over hva som ble forventet av hver og en til enhver tid. Avslutningsvis kommer også god kommunikasjon inn på dette punktet. Dersom det for eksempel er ting som krasjer med andre prosjekter, er det kritisk med kommunikasjon i god tid slik at man kan løse problemer på best mulig måte.

Avlæring knyttet til håndtering av utfordringer og behov i prosjektet

- Perfeksjonisme kan være et hinder for utvikling og fremgang, dersom man bruker alt for mye tid og krefter på små detaljer.
- Dersom en ikke er åpen for tilbakemeldinger kan det hindre en i å lære av feil og gå glipp av gode ideer. Både fra andre i gruppen, men også interessenter.
- Det å være utålmodig kan gi negative virkninger i form av forhastede beslutninger som ikke er gunstig for utviklingen av prosjektet.
- Egoisme er en holdning som kan ødelegge samarbeid og det felles målet til organisasjonen.
- Det å ikke kunne håndtere kritikk på en god måte vil gjøre det svært vanskelig å tilpasse produktet til målgruppen.

Videre reflekteres det rundt konkrete situasjoner hvor avlæring var avgjørende for prosjektets suksess. Fra starten var det flere situasjoner hvor medlemmer av gruppen ikke møtte tidsnok. Dette førte til irritasjon blant de resterende og svekket fremgang og samarbeid i prosjektet. Det ble dermed tydelig at dette var en dårlig vane som måtte avlæres hos de gjeldende medlemmene. For å kunne få til dette på best mulig måte, måtte vi også fokusere på å bedre kommunikasjonen og forventningene vi hadde til hverandre. Alle prosjektmedlemmene tok del i dette, da det var viktige elementer som måtte være på plass først for å få til avlæringen. Ved å gjøre dette oppnådde vi bedre stemning i gruppen og ikke minst bedre effektivitet.

Avlæring når det kommer til det å ikke være åpen for tilbakemeldinger har også vært avgjørende for suksessen. Med en gruppe på syv personer er det viktig å kunne dele kunnskap, reflektere rundt løsninger og med det også være åpen for tilbakemeldinger på arbeidet sitt. Dette gjelder også når det kommer til å være i kontakt med det relevante markedet, og lytte til deres behov og tanker rundt prosjektet. Det har ikke vært situasjoner hvor dette har vært et problem knyttet til markedet, men heller mellom teammedlemmene. Da har vi opplevd å ha diskusjoner som ikke fører noe sted og som stagnerer progresjonen. Ved å avlære dette og heller kunne snu det til noe saklig og lærerikt har ikke bare den enkelte vokst, men også hele gruppen sammen.

Det siste punktet omhandler det å avlære et tankesett om å være stive og rigide. Mange av medlemmene er vant til å ha fag hvor man bare har seg selv å tenke på når det kommer til arbeidet man legger ned og når man gjør det. Dermed har det blitt til at noen har sterke meninger om akkurat når ting skal gjøres og hvor stor arbeidsmengde som skal legges ned. Dette har vi opplevd at blir vanskelig å få til å fungere på en bra måte i gruppen. Igjen førte dette til uenigheter og lite effektivitet. Det var altså avgjørende at denne tankegangen ble byttet ut med å være fleksibel, slik at alle fikk frihet til å finne tid og sted til å gjøre arbeidet sitt på best mulig måte.

Group 0020

Refleksjon over læringsutbytte

Læring

- Kunnskap om byggebransjen og digitale verktøy For å kunne utvikle en relevant spørreundersøkelse og tolke dataene som ble samlet inn, var det viktig å ha en god forståelse av byggebransjen og de digitale verktøyene som brukes i denne bransjen. Dette inkluderte å lære om ulike byggeprosesser, entreprenører, arkitekter, ingeniører og andre nøkkelaktører i bransjen. Det var også viktig å lære om ulike digitale verktøy som brukes for å effektivisere byggeprosessen, som Bygningsinformasjonsmodellering (BIM) og virtuelle virkelighetsmodeller.
- Skape et kreativt og positivt arbeidsmiljø For at prosjektgruppen skulle lykkes måtte vi skape et kreativt og positivt arbeidsmiljø. Dette innebar å skape en atmosfære av

samarbeid og åpen kommunikasjon, hvor alle kunne komme med sine ideer og bidra til å løse problemer. Det var også viktig å ha en positiv holdning til arbeidet og til hverandre, og å ha en leder som kunne motivere og inspirere resten av gruppen.

- Lære om Nettskjema og dens funksjonaliteter For å utvikle en god spørreundersøkelse var det nødvendig å lære om Nettskjema og de ulike funksjonalitetene det har. Dette inkluderte å lære hvordan man oppretter spørsmål, svaralternativer og navigasjon i undersøkelsen. Det var også viktig å lære hvordan man kan bruke logikk i undersøkelsen, og hvordan man kan tilpasse skjemaet til ulike plattformer og enheter. Å lære om Nettskjema var også nyttig for å kunne samle inn data på en effektiv og strukturert måte.
- Viktigheten av en god evaluering Prosjektgruppen har lært viktigheten av en god evaluering. Å evaluere prosjektet var viktig for å kunne lære av erfaringene som ble gjort i løpet av prosjektet. Dette inkluderte å analysere hva som fungerte bra og hva som kunne forbedres, og å identifisere eventuelle problemer eller utfordringer som oppstod underveis. Evalueringen var også nyttig for å identifisere suksessfaktorer og beste praksis som kan brukes i fremtidige prosjekter. Det var viktig å strukturere evalueringen på en grundig måte og å involvere hele prosjektgruppen i denne prosessen for å sikre at alle hadde mulighet til å komme med sine tilbakemeldinger og forslag til forbedringer.

Avlæring

Avlæring handler om å endre eller justere eksisterende oppfatninger, holdninger eller adferd som kan være til hinder for å nå et ønsket mål.

- Fast organisasjonsstruktur: Gruppen måtte avvike fra den vanlige tilnærmingen til å ha en flat organisasjonsstruktur, som kan være vanlig når en vennegjeng samarbeider på et prosjekt. Mens en flat organisasjonsstruktur kan ha sine fordeler, som å fremme samarbeid og kreativitet, kan den også være uheldig i enkelte sammenhenger. I stedet for å bruke en flat organisasjonsstruktur var det nødvendig å ha en fast struktur i prosjektgruppen. Dette betydde at det var viktig å definere klare roller og ansvarsområder for hver enkelt medlem, og å utpeke en leder som kunne ta ansvar for å koordinere arbeidet og ta beslutninger når det var nødvendig. En fast struktur bidro

også til å sikre at alle hadde en klar forståelse av hva som forventes av dem og at de kunne jobbe mot felles mål på en effektiv måte.

- Tilpassing til ulik arbeidsstil og tempo: Individuelle forskjeller som arbeidsstil og tempo varierte i gruppen. Noen medlemmer jobbet raskere enn andre, og det var nødvendig med en holdningsendring i forkant av prosjektet. Gruppen var enig om at det var viktig å være tålmodig og forståelsesfull overfor disse forskjellene. Dersom noen hadde behov for mer tid til å fullføre sine oppgaver, så var det viktig at de andre var villig til å både støtte, samt tilpasse medlemmets tempo. Samtidig var dette et prosjekt hvor det var viktig å holde seg til tidsfrister, slik som i de fleste prosjekter. Måten dette ble løst på var å ha oppnåelige tidsfrister for hele gruppen, samt at vi støttet hverandre ved behov.
- Konstruktiv konflikthåndtering: Håndtering av konflikter på en konstruktiv måte kan kreve avlæring av tidligere vaner og holdninger. I dette prosjektet oppstod det uenighet i begynnelsen om hvorvidt det skulle gjennomføres empirisk analyse eller lages et produkt.

Gruppen diskuterte og stemte demokratisk, og det endte med at empirisk analyse ble valgt som vei videre. Deretter var det uenighet om hva som skulle undersøkes i den empiriske analysen, og medlemmene presenterte sine forslag med begrunnelser. Etter en avstemming ble det valgt et forslag som alle var enige om.

For å takle konflikter på en konstruktiv måte, hadde medlemmene allerede adressert inn i gruppen hvordan de skulle håndtere konflikter før prosjektet startet. Dette krevde at enkelte medlemmer måtte endre tidligere adferd og tilpasse seg en ny måte å håndtere konflikter på. Selv om det ikke var noen store konflikter i løpet av prosjektet, var det en god start å ha en demokratisk tilnærming og å gi medlemmene mulighet til å presentere og begrunne sine forslag.

- Avlæring og omvurdering i forhold til bransjen Det var nødvendig for prosjektgruppen å avlære seg noen av sine tidligere holdninger for teknologi og dens implementering i byggebransjen. Dette skyldes at vår forståelse og anvendelse av teknologi er annerledes fra aktører i byggebransjen, og at vi generelt er mer positive til bruk av teknologi grunnet vårt studie/interesser. For å kunne se hvordan teknologi kan brukes i byggebransjen og for å forstå

arbeidernes og prosjektledernes syn på teknologi, må vi være villige til å se teknologi fra deres perspektiv og forstå deres behov og utfordringer.

Group 0021

Refleksjon over læring og avlæring

Gjennom dette prosjektet var gruppen avhengig av å hente informasjon om emnet fra relevante intervjuobjekter. Hele undersøkelsen baserer seg på en blanding av tidligere erfaringer og nysgjerrighet angående prosjektledelse i byggebransjen. Under er det laget en oversikt over hva som måtte læres, hvordan gruppen lærte dette i praksis og hva som eventuelt måtte avlæres.

Hva gruppen lærte av prosjektet:

- Hvordan det er hensiktsmessig å samle inn informasjon i henhold til problemstilling
- Hvordan man gjennomfører intervjuer
- Planlegging av undersøkelser som krever informasjon av andre, og planlegging av gruppeprosjekter hvor god kommunikasjon er viktig
- Forståelse for byggebransjen og Dalux som programverktøy

Hvilke faktorer gruppen trengte å legge fra seg gjennom prosjektet:

- Bare se egne meninger og synspunkter
- Tidligere erfaring med brukerundersøkelser og informasjonsinnhenting

Hvordan samle informasjon

I starten av prosjektet ble det planlagt å bruke brukerundersøkelser for temaet da gruppen mente at dette ville være en enkel måte for målgruppen å svare på. Det kan være vanskelig å få kontakt med aktuelle kandidater som har tid til å gjennomføre slike undersøkelser, og dersom det ble sendt ut en enkel undersøkelse tenkte gruppen at det var flere som tok seg tid til å svare. Etter hvert som spørsmålene ble utarbeidet, og gruppen fikk mer oversikt over hvilken informasjon som var interessant å hente, ble det tydelig at en brukerundersøkelse ikke

var det beste alternativet. For å skaffe utdypende svar og forståelse for temaet valgte gruppen å gå over til personlige intervjuer.

Under intervjurunden lærte gruppen at det ikke alltid er lett å få kontakt med mennesker i arbeidslivet som er villig til å sette av litt tid til et intervju som er en del av et gruppeprosjekt. Altså ville flere trolig samarbeide dersom undersøkelsen skulle bidra til resultater i forbindelse med bachelor- eller masterskriving. Det gruppen derimot lærte av å gjennomføre intervjuene var at informasjonen ble mer tydelig, og det var enklere å få tydelige og meningsfulle svar ettersom gruppen kunne stille spørsmål på en passende måte i hvert intervju. Det var læringsrikt og givende å møte intervjuobjektene personlig, og det skapte en bedre forståelse for undersøkelsen og problemet i sin helhet. Basert på informasjonen som ble hentet inn i intervjuene kunne gruppen skrive en fullverdig tekst basert på valgt problemstilling.

Lage spørsmål og problemstilling

Under planleggingen av prosjektet var det vanskelig å bestemme seg for problemstillingen for undersøkelsen da gruppen ønsket å være konkret, samtidig som undersøkelsen skulle avdekke problemer ved programmet som brukes flittig i byggebransjen. Gruppen lærte tidlig at det var viktig å lage spørsmål til intervjuet felles, slik at svarene ble sammenlignbare for dokumentasjonen. Det var viktig å bruke tidligere erfaring med programmet i praksis, og annen litteratur fra lignende undersøkelser. Etter intervjurunden fikk gruppen bekreftet at måten spørsmålene ble stilt på var veldig viktig for hvilke svar som ble gitt, og at dette ikke samstemte i alle intervjuer. Gruppen burde satt seg mer inn i hvordan man planlegger og gjennomfører undersøkende intervjuer tidlig i prosjektet, slik at kvaliteten på svarene ville blitt sammenhengende i alle intervjuene. Å samle informasjon er en komplisert oppgave som ble tydeliggjort i løpet av dette prosjektet, og som gruppen tar læring av for fremtidige prosjekter.

Samarbeid og lærdom fra byggebransjen

Som studenter er gruppens medlemmer vant til å jobbe individuelt, eller med færre studenter av gangen. For å gjennomføre dette prosjektet på en god måte var medlemmene avhengige av å jobbe i et team, lytte til andre og diskutere ulike meninger for å komme fram til et svar. Det å ha tydelig kommunikasjon og klare retningslinjer for hvordan diskusjoner skal håndteres har vist seg å være svært viktig for gruppedynamikken. Gruppen opplever at prosjektet har

gitt innsyn i hvordan gruppeprosjekter foregår og hvordan en gruppe kan bidra til å se på problemer fra ulike perspektiv. Dette har bidratt til et bedre prosjekt, selv om det var vanskelig å bli enige for eksempel ved valg av spørsmål og avgrensning av problemstilling.

Gjennom prosjektet har gruppen lært mye angående byggebransjen og kommunikasjon ved hjelp av digitale verktøy. For å reflektere rundt resultatene fra intervjuene var det viktig å sette seg inn i omfang og virkning av gode kommunikasjonsmidler i byggeprosjekter. God kommunikasjon med intervjuobjekter førte til mye læring om relevante temaer for videre studier.

Group 0024

Reflection on learning and unlearning

Upon reflecting on the entire process of our project assignment, we have identified various aspects of project work that we have had to learn, as well as some that we had to unlearn. This was necessary to effectively address the emergent needs and challenges that arose during the course of the project. Below is a list of knowledge, practices and attitudes that have been gained during our work.

6.1 Communication skills

Due to the lack of hierarchy within the group the layout of the application was not formed by one person but by all members. As mentioned in *section 2.1*, during the development of CourseRater, the challenges that occurred were usually related to the design and functionality of the application. Therefore, in order to reach an understanding between all the members, being able to express our own desires while also taking time to consider other suggestions and points of view was important. Good and effective communication led to fewer conflicts later on and was crucial in ensuring that the development process proceeded smoothly.

6.2 Technical skills

The members of the group are fairly competent when it comes to developing web pages and applications. However these can be created by using many various programming languages. Some aspects regarding the technology stack that was used in order to create CourseRater were unfamiliar. An example of a new type of programming tool we had to learn is Firebase.

Firestore stores the data regarding both users and ratings and is necessary in order to make the application work properly. In conclusion it was necessary for the team to obtain more knowledge on how to use unfamiliar technologies.

6.3 Effective work methodology

In order to ensure that the CourseRater application ended up the way it was intended, the group decided to work in accordance with the Scrum framework. However the group members found it difficult to arrange daily meetings throughout the project because of differences in time schedules. As a result, longer weekly meetings were arranged instead. The shift to longer weekly meetings forced the group to develop strategies to maximize the productivity of each meeting. This experience taught the group members the importance of effective time management in project development. The group also learned that adapting to already established work methodology is a vital aspect of project management.

6.4 Availability of source material

In order to be able to add courses to the webpage, our group decided to use public source material from an open API (application programming interface). In other words we had to rely on material produced by someone else. During the final phases of the project work this material suddenly became unavailable. As a result we had to come up with a different solution in order to be able to apply the desired functionality to the webpage. From this we learned that in order to maintain control over the project we have to be certain that the source material we use will be available in the foreseeable future.

6.5 Collaborative thinking

During our project, we had to unlearn certain attitudes and practices that were no longer helpful for the team's efficiency. One common belief that we needed to discard was the idea that our own experiences and perspectives were always the most valid. This can lead to group members being blinded by their own ideas. Instead, we found greater success by adopting the scrum methodology, which emphasizes the importance of considering diverse viewpoints. This approach required all team members to be open to alternative perspectives and work collaboratively to find the best solution to emergent issues and challenges that arose during the project. By doing so, we were able to overcome obstacles and achieve our goals more effectively.

6.6 Teamwork

Another attitude that we had to unlearn during the project was the belief that we could handle every challenge on our own. Instead, we recognized the importance of working collaboratively as part of a team. By doing so, we were able to utilize each other's strengths and overcome challenges that would have been much more difficult to tackle on our own. It is important to have the capability and confidence to handle tasks individually. However, we found that conducting thorough research and analysis on our own, followed by coming together as a team to discuss and refine our ideas was the best approach to maintain an efficient workflow. By balancing individual work and teamwork, we were able to utilize each other's strengths and achieve our project goals more efficiently.

Group 0025

Refleksjon over læring og avlæring

Læring

I løpet av prosjektoppgaven ble gruppen nødt til å erverve seg en rekke ferdigheter, kunnskaper og holdninger for å effektivt håndtere de nye kravene og utfordringene som oppsto. Blant de betydeligste prestasjonene gruppen oppnådde gjennom arbeidet med prosjektet inkluderer følgende:

- Gjennom prosjektoppgaven ble gruppen utfordret til å utvikle en dypere forståelse for betydningen av kritisk tenkning i forhold til data og kilder. For å sikre innsamling av relevant og pålitelig informasjon for prosjektet, måtte gruppen forbedre sine forskningsferdigheter på flere områder. Dette involverte å identifisere pålitelige kilder, grundig analysere data og nøye syntetisere informasjonen for å kunne ta veloverveide og informerte beslutninger.
- I og med at prosjektet involverte samarbeid, var det nødvendig for hvert individ i gruppen å tilegne seg ferdigheter i effektivt samarbeid. Dette innebar evnen til å kommunisere klart og tydelig, aktivt lytte til andre og være åpen for både konstruktiv kritikk og tilbakemeldinger. Ved å utvikle disse samarbeidsevnene kunne gruppen skape en atmosfære av gjensidig tillit og respekt, som bidro til et produktivt arbeidsmiljø og optimale resultater.

- Ettersom prosjektet involverte flere tidsfrister, ble gruppen utfordret til å mestre effektiv tidsstyring for å møte disse forpliktelsene. Dette innebar å utvikle ferdigheter i å prioritere oppgaver, sette realistiske mål og motstå fristelsen til å utsette. Ved å planlegge nøye og arbeide i henhold til en strukturert tidsplan, kunne gruppen sikre at de var i stand til å oppfylle fristene og levere i tide. Å mestre disse ferdighetene i tidsadministrasjon var avgjørende for å opprettholde produktiviteten og sikre at prosjektet forble på rett spor.
- Underveis i prosjektet oppsto uventede problemstillinger og utfordringer som krevde sterke problemløsningsferdigheter. Gruppemedlemmene måtte lære å systematisk identifisere årsakene til problemene, utforske og generere flere mulige løsninger, og deretter nøye vurdere disse alternativene for å velge den mest hensiktsmessige veien videre. Ved å utvikle disse problemløsningssevnene kunne gruppen effektivt håndtere uforutsette hindringer og finne kreative og strategiske løsninger.

Under refleksjonen over situasjoner der læring spilte en avgjørende rolle for prosjektets resultater, kan det nevnes en spesifikk situasjon omhandlende valget av en adekvat metode for datainnsamling. I denne situasjonen ble kombinasjonen av forskningskompetanse og kritisk tenkning avgjørende for å sikre at den valgte metoden ville produsere pålitelige og nøyaktige resultater, spesielt med tanke på den begrensede tidshorisonten for datainnsamlingen. Gruppen gjennomførte en grundig vurdering av forskningsmetodenes relevans og egnethet i forhold til prosjektets behov og den tilgjengelige tidsrammen. Ved å legge vekt på både relevans og validitet i valg av innsamlingsmetode, ble det utviklet en kort, men presis spørreundersøkelse som innhentet verdifulle data innenfor den begrensede tidsrammen. Dette bidro betydelig til å oppnå pålitelige innsikter og informasjon som beriket prosjektets omfang og kompleksitet.

Avlæring

For å sikre framgang i prosjektet, var det nødvendig for gruppen å aktivt frigjøre seg fra visse holdninger, praksiser eller kunnskaper som ikke lenger var hensiktsmessige, utdaterte eller feilaktige. I løpet av prosjektarbeidet oppsto oppdagelser som krevde oss å avvise eller anerkjenne som utdatert, blant annet:

- Gruppens tidligere oppfatning var at alt måtte være feilfritt før levering, noe som førte til unødvendig tid brukt på små detaljer. Imidlertid ble det erkjent at

perfeksjonisme kan hindre fremgang, og det ble klart at det er nødvendig å finne en balanse mellom kvalitet og effektivitet. Det ble innsett at det å prioritere arbeidet og sette realistiske mål var viktigere enn å etterstrebe en urealistisk perfeksjon. Ved å være bevisst på dette kunne arbeidsflyten optimaliseres, og både høy kvalitet og effektivitet ble oppnådd i leveransene.

- Gruppens initielle antakelser og fordommer hadde en innvirkning på vår tenkning ved starten av prosjektet. Imidlertid ble gruppen gradvis klar over viktigheten av å være åpne og vurdere flere perspektiver for å oppnå en mer omfattende forståelse av problemet. Gjennom å være mottakelige for eksterne synspunkter og idéer kunne gruppen berike tilnærmingen og bidra til å finne mer effektive løsninger. Den klassiske problemløsningstrategien for ingeniører måtte legges til side, for å utvide vår tankegang og inkludere flere perspektiver. Dette ga mulighet for å oppnå en dypere innsikt og en mer robust tilnærming til den aktuelle problemstillingen.
- Opprinnelig var gruppemedlemmene defensive når de mottok tilbakemeldinger eller kritikk, noe som begrenset muligheten for vekst og utvikling. Imidlertid ble det etter hvert lært å verdsette konstruktive tilbakemeldinger som en verdifull mulighet for forbedring og personlig vekst. Denne endringen i holdning tillot en åpenhet for konstruktiv tilbakemelding som et middel til å styrke seg selv og oppnå fremgang.

I løpet av prosjektet sto gruppen overfor en utfordring relatert til utleie av kjeledresser, der vi hadde vanskeligheter med å finne en levedyktig løsning. Tidligere prosjektoppgaver hadde vanligvis blitt løst ved å benytte egen erfaring, kunnskap og akademiske ferdigheter. Imidlertid innså vi i dette prosjektet at som en gruppe bestående av studenter som ikke tilhørte målgruppen for konseptet, var det nødvendig å forkaste våre første antagelser og ta i bruk en mer åpen tilnærming. Dette gjorde det mulig for oss å danne kreative ideer og finne en gjennomførbar løsning. Vi måtte avlære vår transsynthet og tidligere innlærte problemløsningsferdigheter for å erkjenne at ekstern datainnsamling var nødvendig for å finne gode løsninger.

Gjennom prosjektoppgaven har gruppemedlemmene hatt en helhetlig lærings- og avlæringsopplevelse som har bidratt til deres personlige og faglige vekst. Denne opplevelsen har gjort det mulig for dem å utvikle nye ferdigheter og kunnskaper, samtidig som de har kunnet avvise utdaterte praksiser og overbevisninger. Dette har resultert i at de har blitt mer effektive som gruppemedlemmer og problemløsere.

Group 0180

Refleksjon av læring

Dette kapittelet tar for seg hva vi som gruppe trengte å lære slik at vi kan håndtere de utfordringene og behovene for å gjennomføre prosjektet.

Vi fant fort ut av at det var minimalt med spillerom innenfor finansiering for kjønns sykdomstesting for studenter ved NTNU Gløshaugen. Dermed har vi lært at når man skal presentere en slik idé, må det komme tydelig frem at det er flere fordeler og blir mindre kostnader med selvtesting på campus. Under kommunikasjonen med SiT lærte vi at det er flere personvernregler når det kommer til henting av fullførte selvtester. Det er nemlig bare helsepersonell som kan frakte testene og journalføre disse. Gruppen lærte at finansiering kan være en stor utfordring i slike prosjekter og innså at dermed at det var viktig å møte interessenter med løsninger som ikke presser deres budsjett. En mulig løsning i denne situasjonen er at samme person som frakter testene fra helsestasjonen også frakter de fra campus i samme tur til St. Olavs laboratoriet. Da vi kontaktet St. Olavs laboratoriet ble vi møtt med en uforventet respons. Vi sendte en e-post til laboratoriet og forklarte, noe upresist, hva prosjektet vårt handlet om og om hva slags kapasitet de har. Her ble dette oppfattet som at vi ville at de skulle være en interessent som skulle bidra i hele prosessen. Vi trengte bare å vite om de hadde kapasitet til å ta inn flere tester på laboratoriet sitt. Her lærte vi at det er sentralt å kommunisere klart hva man trenger av interessenter for å unngå misforståelser og forvirring.

Her presenteres en liste med kunnskap og holdninger vi har tatt med oss fra prosjektet.

- Økonomi
- Klar kommunikasjon
- Viktig å lytte til hva interessenten har å si istedenfor å fokusere på egen presentasjon
- Innsikt i flere lover og retningslinjer vedrørende medisinsk prøvetakning og personvern

Liste over holdninger, praksis eller kunnskap som gruppen har funnet ut gjennom prosjektet:

- Vi har erfart at ved å bli bedre kjent har produktiviteten i gruppen økt.

- Gruppen fikk innsikt i kompleksiteten om personvern i forhold til testing av kjønns sykdommer
- Gruppen lærte at distribuering av selvtester på campus er mer kompleks enn antatt
- Gruppen har lært at kompleksiteten rundt frakt av personvern opplysninger er strengt
- Studentene måtte forholde seg til ny gruppedynamikk og kommunikasjon, de måtte alle tilpasse seg
- I praksis trenger det å være en tester som har kompetanse til stede for både journal skriving og testing

Prosjektet trengte en annen tilnærming til testing og fokus på andre viktige kjerneområder. Gruppen møtte på noen utfordringer, men takket være et løsningsorientert team kunne vi justere kjerneområdet og finne bedre løsninger for prosjektet.

Da SiT og St. Olavs laboratoriet fortalte om deres trange budsjett, tvang dette oss til å endre tenkemåten og finne en alternativ måte å gjennomføre prosjektet på. Vi konkluderte med at det ville være mer realistisk å utsette prosjektet til et senere tidspunkt enn våren 2023.

Trondheim kommune er allerede vurderingsfasen for høyere budsjett til helsestasjoner, og ved innføring av dette vil prosjektet være en god base for oppstart av selvtesting på campus Gløshaugen.

Group 0405

Refleksjon over situasjoner der læring og avlæring var avgjørende for å lykkes med prosjektet

Læring og avlæring er viktig for å lykkes i et prosjekt. Særlig når det oppstår utfordringer og behov. Dette krever at man tilpasser seg, eller er nødt til å lære nye ferdigheter for å håndtere dette på best mulig måte. Denne delen ber oss om å reflektere over læring og avlæring. Vi skal nå se på hva vi trengte å lære for å håndtere de utfordringene som oppsto undervis i prosjektoppgaven. Vi skal også reflektere over hva vi trengte å avlære for å lykkes med prosjektet vårt.

Den første situasjonen der læring var veldig avgjørende for å lykkes med prosjektet, var å tilegne oss nok relevant kunnskap. I hovedsak dreide dette seg om å gjøre god nok research om temaet vi valgte å skrive om. Dette gjaldt også for utførelsen av «pre-report». For å levere en god oppgave var alle medlemmene nødt til å få en dypere og mer detaljert forståelse av emnet. Vi manglet nødvendig kunnskap for å utføre prosjektet. Derfor var det viktig å lære er om emnet vi skulle jobbe med. Eksempler på dette var å studere relevant teori og bakgrunn for prosjektet vi skrev om.

Et av gruppemedlemmene hadde allerede god kunnskap om emnet, så hun måtte godta en rolle der hun måtte forklare og «undervise» oss om emnet. For dette gruppemedlemmet var det viktig å ha en positiv holdning med litt ekstra tålmodighet i perioden vi andre leste oss opp på emnet. For dette gruppemedlemmet var det viktig å være tålmodig frem til vi andre hadde fått satt oss inn i emnet og tilegnet oss mer kunnskap om prosjekttemaet.

En annen konkret praksis og ting vi var nødt til å lære mer om var den kvalitative metoden, deltagende observasjon. Vi benyttet oss av forskningsmetoden deltagende observasjon for å utføre prosjektet. Vi var nødt til å lære mer om hvordan man mest effektivt benyttet seg av denne metoden, og tips til å få mest ut av denne metoden.

Det var også noen situasjoner der avlæring var avgjørende for å lykkes med prosjektet vårt. En av holdningene vi måtte forkaste tidlig var ønsket om å ha mest mulig ansvar alene over sluttresultatet. Dette er et gruppeprosjekt, og skal lære oss hvordan et prosjektteam effektivt jobber mot et felles mål. Så en praksis vi måtte avlære var å endre måten vi var vant til å jobbe på.

Vi har alle mest erfaring om å ha hovedansvaret alene, så vi måtte alle akseptere at vi var et team som skulle samarbeide om et felles resultat. Vi har også utviklet en holdning om at alt arbeid og kommunikasjon ikke trenger å skje fysisk. Mye av arbeidet og kommunikasjon har skjedd over Teams og andre digitale kanaler. Vi har fått styrket evnen til å stole på andre, og bedret samarbeidsevnen. Vi har erfart at avlæring av vanen om å jobbe mest individuelt har ført til nyttig kunnskap om at teamarbeid er effektivt og gir gode resultater.

En annen spesifikk holdning vi måtte endre i tidlig fase var at vi hadde en noe negativ holdning til arbeidsmengden. Siden vi var færre gruppemedlemmer enn andre grupper, følte vi at arbeidsmengden kunne bli litt stor i emnet. Denne holdningen kunne ha ført til at vi hadde fått det vanskelig med å fullføre prosjektet på en god måte. Vi måtte jobbe med å endre

innstillingen, og ved hjelp av god planlegging og kommunikasjon fikk vi laget en god plan og struktur får å gjennomføre prosjektet. Da fikk vi en positiv innstilling, og skjønnte at det var overkommelig.

For å kort oppsummere så er dette de mest sentrale elementene vi følte vi måtte lære og avlære for å utføre prosjektet på en vellykket måte. Det viktigste var å tilegne oss nok ny kunnskap, og legge en god plan for prosjektet før vi startet. Det var også viktig å avlære holdningen om at selvstendig arbeid er best, og finne en god måte å samarbeide på. Slik ble kommunikasjonen effektiv og ingen misforståelser oppsto.

Group 0923

Refleksjon av læring og avlæring

Prosjektplanen beskriver at gruppen har noe kunnskap innenfor prosjektledelse, men at det må læres mer om hvordan oppgaven kan gjennomføres på en vellykket måte. Kunnskap måtte også tilegnes for at gruppen på en god måte kunne svare på relevante spørsmål som gjaldt faget *praktisk prosjektledelse*. Utover i prosjektet identifiserte gruppen viktigheten av å ta i bruk relevante verktøy i utviklingsprosessen, samt å forstå behovene til målgruppen. Disse lærings-og avlæringsmomentene vil bli diskutert i denne delen.

I etterkant av oppstartsfasen er det enklere å se at det mest verdifulle læringsaspektet har vært å forstå de andre gruppemedlemmene sine ambisjoner for faget og prosjektets helhet. Dermed fikk man understreket viktigheten av å ha tilstrekkelig og god nok kommunikasjon, samt å ha et samarbeid der alle la grunnlaget for en felles forståelse av situasjoner. Dette blir gjort ved at man ga beskjed når noe er uklart, og spør om forklaring. Underveis i prosjektet ble dette problemet håndtert, og erfaring fra dette ble tatt med videre slik at alle på gruppen til enhver tid skulle være på samme bølgelengde. For å kombinere tidligere kunnskap og ny læring gjennomførte gruppen et møte slik at alle kunne dele det de kunne fra før og det de ønsket dypere innsikt i. Arbeidsoppgavene ble fordelt slik at de som ønsket å lage produktet på verkstedet fikk gjøre det, mens andre konsentrerte seg om rapportene, og tilegning av nytt fagstoff relatert til disse.

Etter at idemyldringen var ferdig, begynte enkelte i gruppen å tegne potensielle prototyper. Produktet er som nevnt en videreutvikling av det tidligere ReLeaf prosjektet. Dette har

medført at mange læringsmomenter fra ReLeaf er tatt hensyn til i utviklingen av produktet. En bemerkning som ble gjort var at fjorårets design var for stort, og at produktet tok for mye plass (Ringstad, L. *et al.*, 2022). Ved å redusere størrelsen på produktet ble det enklere å produsere, noe som potensielt kan øke sjansene for at det blir masseprodusert, og at produksjonen blir billigere. Den ferdige prototypen endte opp annerledes enn produktet fra i fjor, da erfaringer og kontakt med interessenter tilsa at det var mange forbedringspunkter som kunne gjennomføres.

En annen viktig faktor for å oppnå suksess i prosjektet er planlegging med hensyn på tid. For å ferdigstille produktet trengs det en vellykket prosjektplan som sørger for at de ulike fasene av prosjektet er gjennomført til de satte tidsfristene. Denne prosjektplanen bør bestå av ideer, markedsanalyse, design og utforming av produkt, byggeperiode og montering. Selv om prosjektet ikke nødvendigvis har fulgt gruppens tidsplan nøyaktig, setter den en standard med fokus på milepæler. Dermed er det enkelt å se om man ligger etter skjema, og hvor det må legges inn ekstra innsats. Prosjektledelsen har erfart at selv om tidsskjemaet er viktig, er det mye underveis som ikke går etter planen. Dette gjør at det er viktig å kunne omstille seg, og komme inn på rett spor selv om enkelte deler av prosjektet tar lengre tid enn planlagt.

På verkstedet var det flere problemer som oppstod underveis. Ett av disse var å sette sammen prototypen. Etersom mange versjoner av deler ble produsert var det utfordringer med at nye deler ikke samsvarte med de som allerede var produsert. Det ble med andre ord gjort designendringer på allerede printede deler, som for eksempel å legge inn hull for at delene skulle passe. Dette var ikke en del av prosjektplanen, og med et stramt tidsplan var det derfor et stort avvik. For å spare tid ble problemet løst ved å tenke utenfor boksen og eksempelvis drille enkelte hull større og lime på ekstradeler. Om produktet i senere tid skulle blitt masseprodusert og solgt kommersielt ville disse problemene blitt løst på en bedre måte. For å unngå å møte på samme problem igjen vil det være fordelaktig med et større fokus på samarbeid mellom CAD og verksted, slik at det er sikkert at delene som designes passer sammen når de monteres. Det er også viktig å vektlegge at om prosjektplanen hadde blitt fulgt i tidlig stadium av prosjektet, ville det vært bedre tid til å håndtere slike utfordringer underveis. Dermed hadde verkstedgruppen hatt tid til å produsere en ny del som passet til prototypen som allerede var laget.

Elektronikken som ble benyttet var heller ikke feilfri. Det ble lest av feil fuktighetsmåling underveis i testingen av prototypen. Her har gruppen tilegnet seg verdifull læring i å følge

opp produktet til enhver tid, og nøye teste delene som blir laget. I prosjektplanen er en av suksessfaktorene at gruppen skal ha *god prosjektoppfølgning*. Dette har vært viktig å følge gjennom hele semesteret, da dette punktet har gjort at gruppen tidlig kan håndtere problemer som oppstår. Gruppen har eksempelvis gjort endringer i “hev-og-senk”-mekanismen underveis, ettersom den skapte problemer som påvirket vannslangen til produktet.

Til slutt skal noen av avlæringsmomentene som har oppstått underveis i prosjektet nevnes. Selv om flere var godt kjent med å jobbe i grupper, var det få som hadde erfaring med å jobbe i en gruppe av denne størrelsen. Medlemmene har måttet avlære seg å ha en selvstendig tilnærming til problemløsning, samt å inkludere alle gruppemedlemmer i avgjørelser som tas. Dette har vært en grunnpilar for at prosjektet skal bli vellykket. Som tidligere nevnt ble det i startfasen arbeidet mye med en felles forståelse av fremgangsmåten til prosjekt, slik at det ble lagt et godt fundament for videre arbeid gjennom semesteret.

Gruppen har også avlært troen på at bare den originale ideen kan betraktes som en suksess. Nødvendige justeringer har blitt gjort underveis, som gjør at produktet ikke er fullstendig slik som i den opprinnelige prosjektplanen. Likevel er produktet fortsatt fullt funksjonelt og kapabelt til å gjennomføre de samme oppgavene. Gruppen mener at justeringene underveis har gjort produktet enda bedre enn det som var planlagt. Dette har gitt oss en god mulighet til å avlære troen på at det er et nederlag om utviklings- og produksjonsfasen ikke går nøyaktig som planlagt.

Group 0987

Refleksjon over learning og unlearning

Learning

Vi har lært at en dedikert prosjektleder er avgjørende for å sikre organisering og målretting i arbeidet, spesielt i perioder med høye arbeidsmengder. I startfasen hadde vi problemer med å fordele ansvar og initiativ, men da en av gruppemedlemmene tok styring, opplevde vi en økende grad av effektivitet og struktur i prosjektet.

Vi så verdien av å skrive en grundig risikovurdering for pre-report, som hjalp oss med å identifisere mulige utfordringer som kunne oppstå løpet av prosjektet. Ved å forberede oss på disse situasjonene på forhånd, var vi bedre i stand til å takle dem hvis de skulle oppstå. En av de største risikoene vi identifiserte, var knyttet til hvor stor interesse studentene ville ha

for produktet vårt. Vår markedsundersøkelse bekreftet denne bekymringen da vi opplevde varierende deltakelse fra studentene. Dette viste oss viktigheten av å skrive risikovurderinger tidlig i prosjektet og ikke vente til etter at problemene har oppstått.

Under utviklingen av produktet økte flere av gruppe medlemmenes tekniske kompetanse, spesielt innen app-utvikling. Gjennom eksperimentering og læring av nye programmeringsspråk og verktøy som var nødvendige for å bygge vår app-prototype, fikk vi verdifull erfaring og kunnskap. Dette vil være nyttig for oss i fremtidige prosjekter og karriere.

Unlearning

I startfasen av prosjektet, hadde vi visse forventninger om at utviklingen av en app ville være en stor utfordring. Men ved å følge en grundig plan, fordele ansvar og oppgaver, samt etablere effektiv kommunikasjon og samarbeid internt i gruppen, opplevde vi at arbeidet var overkommelig. Dette illustrerer viktigheten av en strukturert tilnærming til prosjektledelse og samarbeid, som kan resultere i positive resultater for prosjektets fremgang og suksess.

Opprinnelig antok vi at arbeidsflyten i prosjektet ville være jevn gjennom hele perioden, men vi opplevde at uforutsette hendelser som eksamener, store oppgaver i andre fag, reiser og sykdom oppsto hyppig og uregelmessig. Vi måtte dermed være mer fleksible og tilpasse arbeidsplanen etter disse hendelsene. Vi fokuserte på å utnytte tiden best mulig og møtes når det var praktisk for alle.

Da vi startet utviklingen av produktet, hadde vi en forventning om at vår store interesse og engasjement for produktet ville bli delt av andre studenter, som var vår primære målgruppe. Imidlertid viste vår markedsundersøkelse at dette ikke var tilfellet. Dette fikk oss til å erkjenne viktigheten av å være bevisst på våre egne forutinntatte holdninger og å være villige til å reflektere over dem. Dette kan bidra til å forbedre vår forståelse og kommunikasjon med målgruppen, og sikre at produktet blir tilpasset deres behov og ønsker.

Group 1007

Refleksjoner rundt lærdommene fra prosjektet

Gjennom å jobbe med dette prosjektet i 12 uker, har vi flere lærdommer som vi tar med oss videre til senere prosjektarbeid, samt avlæringer. Prosjektet hadde flere ulike behov og stilte krav til gruppa på en slik måte at vi ble nødt til å lære oss nye metoder for samarbeid, samtidig som vi også oppdaget et par ting vi kan ta med oss videre i neste prosjekt. I denne delen presenterer vi refleksjoner rundt lærdommer fra prosjektet, og har valgt å utdype refleksjoner rundt lærdommer knyttet til fremdriftsplanlegging og kommunikasjon. Grunnen til dette valget skyldes at gruppen hadde størst læringsutbytte i disse punktene, og dette er den lærdommen vi mener at man vil ha best nytte av i senere prosjekter.

Lærdommer

For å håndtere utfordringene og behovene i prosjektet vårt, måtte vi lære oss:

- Å planlegge fremdrift, og på denne måten også analysere hvilke oppgaver som var avhengige av hverandre.
- Å utforme et brettspill, særlig med tanke på regler, brukervennlighet og utforming av spørsmål.
- Å kommunisere godt sammen. Dette ble gjort gjennom en felles Messenger-chat, Microsoft Teams og fysiske møter. Det kan være en utfordring for kommunikasjonen å ikke kjenne hverandre fra før av, som var tilfellet for deler av vår gruppe, men med en god kommunikasjonsplan var ikke dette noe problem.
- Å fordele arbeidsoppgaver mellom gruppemedlemmene, at vi var en bredt sammensatt prosjektgruppe med ulik bakgrunn gjorde dette enda enklere.

Fremdriftsplanleggingen var kritisk for læringen i prosjektet, da fremdriftsplanleggingen bidro til mange av de andre læringspunktene. Fremdriftsplanleggingen bidro til kommunikasjonen ved at den bestemte når vi skulle være ferdig med ulike arbeidsoppgaver og dermed også når vi skulle ha de fysiske møtene våre. Den bidro også til å fordele arbeidsoppgavene, ved at vi så hvilke oppgaver som var avhengige av hverandre, og hvilken rekkefølge oppgavene burde gjøres i.

Kommunikasjonen var også kritisk for læringen i prosjektet, da det aller meste i et prosjekt er avhengig av god kommunikasjon. Ved å kommunisere godt sammen, ble arbeidsoppgavene godt fordelt og den gode kommunikasjonen gjorde det generelt mye lettere å arbeide med prosjektet. God kommunikasjon var også med på å bidra til at gruppa hadde et hyggelig og

imøtekommende miljø, som f.eks. førte til at alle kunne komme med idéene sine og ulike forslag, uten å være bekymret for negative tilbakemeldinger fra resten av gruppa.

Avlæringer

I tillegg til å ha lært oss nye metoder for å bedre samarbeidet, har vi også avlært ulike holdninger:

- Gruppen avlærte i løpet av dette prosjektet å kun stole på sine egne ferdigheter for at prosjektet skulle bli en suksess. Derfor lærte gruppen å ha tillit til at de andre gruppemedlemmene også arbeidet mot gruppas felles mål. Gjensidig tillitt er viktig for gjennomføringen av et prosjekt.
- Gruppen har også avlært at det er nødvendig med en leder i enkelte tilfeller. Alle gruppesammensetninger er forskjellige og det er viktig å ta hensyn til medlemmene i gruppa, noe som gjør at det ikke alltid er fordelaktig med en leder dersom gruppen fungerer best med en ikke-hierarkistisk struktur.
- Ved prosjektstart hadde gruppen et optimistisk syn på hvordan studenter samhandler på tvers av klassetrinn og studieretning. I løpet av prosjektarbeidet har gruppen avlært at det er en selvfølge at studenter som ikke har kjennskap til hverandre er villige til å samles, og dette burde blitt vurdert som en risikofaktor tidligere i prosjektet.

Group 1234

Refleksjoner på learning and unlearning

Det er nyttig å reflektere rundt læring og avlæring etter å ha arbeidet med et prosjekt, for å se hva som har vært nødvendig å lære og avlære for å møte utfordringene som dukker opp underveis i prosjektene.

Prosjektet har vært utfordrende og lærerikt, men manglet noe koordinering og kommunikasjon i tidlig fase. Gruppen hadde ikke en klar leder tidlig som kunne definere mål, fordele oppgaver og følge opp fremdriften. Dette har ført til at en del tid ble brukt på å diskutere og organisere prosjektet, i stedet for å fokusere på å levere et godt resultat. Gruppen har lært at dersom en ønsker høy effektivitet også i tidlig fase, lønner det seg å ha en leder fra starten av prosjektet som tar ansvar for å lede gruppen på en måte som fremmer samarbeid og

effektivitet. Det gruppen var nødt til å avlære seg i dette prosjektet er at det kan være skummelt å velge en leder i tidlig, spesielt i studentprosjekter der en ikke alltid kjenner hverandre fra før. Dette fordi at medlemmer kan være redde for å ta på seg ansvar og at en får feil leder. Dersom gruppen definerer rollen tydelig, fremmer åpen kommunikasjon og har en inkluderende beslutningstaking, vil dette gjøre lederrollen mindre avskrekkende og dermed skape mer motivasjon rundt rollen.

Et annet viktig læringsmoment var viktigheten av god informasjonsdeling slik at hele gruppen hadde en felles forståelse. Arbeidsoppgavene ble fordelt på ulike gruppemedlemmer. Dette var effektivt, men førte for eksempel til at de som gjennomførte intervju og spørreskjema satt på mer kunnskap om disse forholdene enn resten av gruppen. Gruppemedlemmene prøvde å videreformidle innhentet informasjonen gjennom en skriftlig oppsummering. Dette funket tilsynelatende greit, men senere i prosjektet oppdaget vi at de ulike medlemmene på gruppen hadde ulike oppfatninger om interessenthåndteringen i forprosjektet. Dette gjorde det vanskelig å ha gode diskusjoner og misforståelser oppstod. Det var kjipt å bruke mye tid på å nøste opp i disse misforståelsene, men absolutt nødvendig at alle hadde samme bilde av situasjonen. Vi reflekterte rundt informasjonsdeling og lærte at en bedre løsning kunne vært å istedenfor ha en slags ”workshop” der funnene ble presentert med resten av gruppen. Slik kunne aktuelle spørsmål fra resten av gruppen blitt besvart med en gang og alle ville hatt samme grunnlag. Det var kun to fra gruppen som deltok i intervjuet og dette var den mest kritiske delen av vår analyse. Her kunne vi ha inkludert flere fra gruppen slik at kunnskapen ble bredere fordelt.

Som nevnt tidligere var det mange utfordringer knyttet til å være en gruppe på syv personer. I startfasen ville vi ha en uniform arbeidsfordeling der forventningen var at alle gruppemedlemmer skulle bidra like mye. Til å begynne med var vi optimistiske på å få til et par møter i uka der alle kunne delta, men dette viste seg å ikke gå opp, da som nevnt tidligere alle gruppemedlemmer er på varierende stadier i studiet, går forskjellige studieretninger og har ulike fag. Realiteten var at enkelte gruppemedlemmer hadde stor arbeidsbelastning, mens andre enten sto på vent eller ikke var tilgjengelig. Det tok litt tid før vi slo oss til ro med dette og aksepterte at uniform arbeidsfordeling måtte avlæres, nettopp basert på våre forventninger fra start. Da vi endelig aksepterte at ulike gruppemedlemmer ville bidra ulikt i ulike faser, ble det enklere for prosjektkoordinatorene å overdelegere arbeid til enkelte medlemmer i perioder der få gruppemedlemmer var tilgjengelige og heller avlaste disse i andre perioder der flere medlemmer var til stede.

Disse læringene og avlæringene er noe vi som gruppe kommer til å ta med videre for å sikre suksess i fremtidige prosjekter.

Group 1515

Refleksjon over læring og avlæring

Alle prosjektdeltakerne har i forbindelse med studiet mye erfaring fra prosjektarbeid. Valg av strukturen påprosjektgruppen er sjelden noe man har diskutert, og vanligvis har man ubevisst endt med å adaptere en flat struktur. I dette prosjektet valgte vi derimot å utpeke en fast prosjektleder. Hovedårsaken til at gruppen gikk for en tydelig rollefordeling under dette prosjektet var blant annet at man hadde blitt gjort oppmerksom på nytteverdien av dette i andre emner. I tillegg ble det under utarbeidelsen av pre-report satt en forventning om at prosjektets struktur skulle være så virkelighetsnær som mulig.

Gruppens vurdering var at selv om dette ikke skulle vise seg å være et optimalt valg ville det å arbeide i et dysfunksjonelt team også gi mye relevant læring knyttet til dette emnet. Det var også et behov for en kontaktperson mellom gruppen, studentassistentene, og foreleseren.

Deltakerne ble positivt overrasket over hvor merkbar endring dette hadde på fremdriften i gruppen. Fordelingen av ansvarsområder gikk mer effektivt med en leder i spissen. Prosjektdeltakerne hadde sjeldent konkrete ønsker om hvilke oppgaver de ønsket å ta seg, hvilket tydeliggjorde fordelene av å ha en prosjektleder.

Valget av en hierarkisk struktur førte til at alle prosjektdeltakerne måtte tilpasse seg nye roller. Prosjektlederen måtte kvitte seg med tanken om å være en del av gruppen. Selv om lederen ikke kviet seg for å ta på seg ansvar, var det utfordrende å ta på seg oppgaven med å delelegere ansvar til andre. Til tross for dette synes resten av gruppen at lederen løste oppgaven på en veldig god måte, og at det var avgjørende for at arbeidet fungerte så godt som det gjorde. Det ble lettere for prosjektlederen å dele ansvarsområder til de to subgruppene, slik at oppgavene ble brutt ned i mindre arbeidsoppgaver deretter. De andre prosjektdeltakerne måtte avvenne seg holdningen om at alle er likestilte med tanke på avgjørelser, og akseptere at prosjektlederen hadde det avgjørende ansvaret for beslutningene som skulle tas.

Tidligere har prosjektdeltakerne hovedsakelig jobbet i grupper med tre til fire deltakere. I dette prosjektet var det dobbelt så mange, og dette var uvant for mange av deltakerne. Det

ekstra behovet for koordinering og kommunikasjon ble derfor en utfordring for gruppen. En nyttig erfaring gruppen gjorde seg var at det var nødvendig å ha en kontaktperson mellom de to subgruppene. Dette var en rolle som naturlig tilfalt prosjektlederen. Innad i gruppen bidro det til mindre forvirring fordi gruppen hadde en konkret person å henvende seg til ved spørsmål. Deltakerne tror valget av å ha en prosjektleder var ekstra nyttig da ingen av oss hadde erfaring med å jobbe i så store grupper før, eller har hatt behov for å koordinere ulike subgrupper i et felles prosjekt. Siden vi var så mange var det også praktisk at det var en fast person som tok ansvar og initiativ til å booke rom og kalle inn til møter. I subgruppene tok ikke deltakerne et aktivt standpunkt til strukturen, og subgruppene adapterte naturlig en flat struktur. Gruppen tror grunnen til dette er at prosjektdeltakerne allerede er kjent med og komfortable med arbeidsprosessene og kommunikasjonsrutinene, og gruppen trodde det kunne bidra til økt effektivitet i arbeidet. I ettertid ser vi at det også her kunne vært nyttig med en leder innad i subgruppene slik at kommunikasjonen og koordineringen mellom gruppene hadde blitt bedre. Arbeidet innad i subgruppene fungerte bra, og det er vanskelig å si hvordan valg av en gruppeleder ville påvirke dynamikken innad i gruppene. Om valget av å ikke ha en leder innad i subgruppene var riktig er derfor vanskelig å vurdere, men det er en faktor prosjektdeltakerne kommer til å være mer bevisst på inngangen til fremtidige prosjekter.

Gruppen har lært at en flat gruppestruktur ikke alltid er det mest effektive i et prosjektarbeid selv om dette for mange av prosjektdeltakerne er en godt innarbeidet norm og den arbeidsmetoden de er mest komfortable med. En hierarkisk struktur kan være ekstra viktig å vurdere dersom man er mange på gruppen fordi det da er behov for mer koordinering. I fremtidige prosjekter vil prosjektdeltakerne derfor i større grad være bevisst på hvilken struktur som velges.

Gruppen tror det at man har vært flere deltakere på prosjektgruppen enn det man er vant med kan være en medvirkende årsak til at møtene ble nedprioritert. Tidligere har flere av prosjektdeltakerne erfart at der det bare er tre til fire deltakere på gruppen er arbeidet i stor grad avhengig av at alle møtes samtidig. Dette fordi hver person har ansvar for en betydelig andel av prosjektet, og det er derfor ekstra viktig at alle har innsikt i hva som skjer på alle områder av prosjektet. For gruppen ble det derfor naturlig å forsøke å legge møtene til tidspunkter der alle deltakerne hadde mulighet til å delta. Fordi det var så mange på gruppen viste det seg at slike tidspunkter var vanskelig å finne, og forsøket på å inkludere alle ble derfor en faktor som bidro til at arbeidet stoppet opp.

Når gruppen kom i gang med møter igjen opplevde prosjektdeltakerne at arbeidet gikk mer effektivt. Flere diskusjoner i plenum bidro til at deltakerne i større grad klarte å hjelpe hverandre og komme med innspill dersom noen satt fast. Gjennom jevnlig møter fikk man også en kontinuerlig evaluering av prosjektet. Dette gjorde at gruppen kunne gjøre mindre tilpasninger underveis, oppklare misforståelser, og dermed kunne utnytte tiden mer effektivt. Flere av prosjektdeltakerne har påpekt at de til tider skulle ønske det var flere diskusjoner og uenigheter innad i gruppen. Vanligvis har deltakerne bevisst forsøkt å skape harmoni innad i gruppen. I mange tilfeller har de latt være å ta opp utfordringer eller synspunkt de mener kunne vært gjort annerledes fordi de mener problemene ikke er viktige nok til å ofre et godt arbeidsmiljø. Mange av prosjektdeltakerne beskriver seg selv som konfliktsky, og at de derfor ikke ønsker å bidra til og lage problemer der det ikke er noen fra før av. Vi ser nå at dette er en holdning som kan gå utover kvaliteten på leveransen. Dersom gruppen aktivt unngår diskusjoner kan man gå glipp av mange verdifulle innspill. Selv om man ikke er enig vil det sette i gang tankeprosesser og dermed bidra til bedre argumenter og mer reflekterte diskusjoner. I dette prosjektet kunne dette for eksempel vært nyttig i forbindelse med utarbeidelsen av spørreundersøkelsen og intervjuguiden. Dette kunne bidratt til høyere kvalitet på spørsmålene, og dermed en bedre undersøkelse. Fremover tror deltakerne det derfor kan være nyttig å i større grad forsøke å skape et miljø der det er rom for konflikter framfor at alle skal komme overens.

Deltakerne opplevde at det å jobbe i fellesskap også hadde stor positiv påvirkning på arbeidsmoralen til gruppen, og bidro til at flere av deltakerne fikk et større eierskap til prosjektet. Dermed ble de mer opptatt av kvaliteten på det de ønsket å levere. Når gruppen møttes oftere ble kommunikasjonen bedre og det var lettere å få en oversikt over hva de andre prosjektdeltakerne jobbet med og hvor langt de hadde kommet med sine oppgaver. Møtene bidro derfor til en bedre oversikt over fremdriften og statusen på prosjektet. De fungerte også som naturlige milepæler og bidro til en kontinuerlig evaluering av prosjektet. Møtene bidro også til en noe jevnere arbeidsfordeling blant prosjektdeltakerne. Fordi alle deltakerne fikk en bedre oversikt over hva resten av gruppen holdt på med, ble det lettere å gjøre tilpasninger slik at enkelte deltakere ikke ble sittende med for mye arbeid på egen hånd. Slike tilpasninger viste seg å være nødvendig fordi det var vanskelig å forutse arbeidsmengden de ulike oppgavene krevde. Noe av årsaken til dette er nok at gruppen kommuniserte for lite i selve arbeidsfasen av prosjektet. Dersom deltakerne hadde fokusert mer på å planlegge arbeidsfasen i prosjektet, ikke bare innledningsfasen, ville gruppen

sannsynligvis hatt bedre oversikt over hva de ulike arbeidsoppgavene innebar og hvor mye innsats de kom til å kreve. Alle prosjektdeltakerne er derfor tydelige på at dette er noe de kommer til å ha fokus på i fremtidige prosjekter.

I etterkant viste det seg at gruppen burde fokusert mer på å fordele fagkunnskapene til prosjekt- deltakerne mellom de to arbeidsgruppene. Gruppen valgte å spisse oppgaven spesifikt inn mot byggebransjen, og i etterkant er det tydelig at en bedre fordeling av fagkunnskaper mellom de to subgruppene ville vært nyttig. Ingen av prosjektdeltakerne har noe særlig erfaring med å jobbe i tverrfaglige team. De har hovedsakelig jobbet med studenter fra eget studieprogram. Ulik fagkompetanse innad i en gruppe er derfor ikke en faktor prosjektdeltakerne har trengt å ta hensyn til tidligere. Erfaringene fra dette prosjektet har derimot vist at dette kan ha betydelig påvirkning på arbeidsprosessen, og en fornuftig fordeling av fagkompetanse er derfor noe alle deltakerne kommer til å ha fokus på i fremtiden.

En annen erfaring gruppa gjorde seg var at det var lettere å identifisere de faktorene som ledet til fiasko enn de faktorene som ledet til suksess. For eksempel var det i ettertid lett å se at manglende kommunikasjon midtveis i prosjektet bidro til at prosjektet stoppet opp.

Vanskeligere var det å finne ut om en flat struktur i subgruppene var en av årsakene til at arbeidet fungerte bra, eller om det ville vært mer hensiktsmessig med en tydelig leder.

Tidligere har prosjektdeltakerne ofte hatt en tendens til å fokusere på det som går galt. Dette har ofte bidratt til å forsterke problemer og ført til en negativ stemning i gruppen. Dette er en tankegang deltakerne vil forsøke å venne oss av. Fremover kommer deltakerne i større grad til å fokusere på hvilke steg i prosessen som fungerer godt, slik at man i større grad kan spille på egne styrker. Slik vil man ikke bare forebygge fiasko, men også søke suksess.

Group 1709

Refleksjon rundt læring og avlæring

Det var flere elementer som gruppemedlemmene måtte sette seg inn i for å få bedre forståelse for oppgaven. Blant annet:

a. Planlegge og analysere innleveringene, ettersom det var flere delleveringer igjennom semesteret.

- Tidseffektivitet var noe vi måtte lære oss igjennom semesteret. Kombinasjonen av innleveringsoppgaver, arbeid med disse, og ikke minst prosjektoppgaven krever sitt når det kommer til planlegging. Selv om vi ikke var de beste på å følge prosjektplanen, ble alle innleveringene gjort innen fristen – og prosjektoppgaven ble unnagjort.

b. Alle måtte lese seg opp på bruken av AI, samt fordeler og ulemper rundt bruken av det.

- Det var et spennende felt vi skrev oppgave om, og det kunne kanskje vært hensiktsmessig å ha et gruppemedlem med litt forkunnskaper innenfor feltet. Vi skal jo bruke kunnskapene vi har i gruppen når det kommer til gruppearbeid, men i dette tilfelle falt vi for den første og beste oppgaven vi kom med. Det var interessant lesing, men det tok mer tid enn planlagt. Vi kunne heller kjørt prosessøvelser før vi besluttet oss for en oppgave, for eksempel «crazy eight» eller andre design thinking øvelser. Slik kunne vi heller fått utnyttet gruppemedlemmenes kunnskaper på en bedre måte, og samtidig spart oss for mengden research.

c. Utvikle risikoplan, og håndtering dersom det skulle oppstå noe forutsett eller uforutsett.

- Ved alle prosjekter er det risikoer innblandet, der noen kan være forutsett og andre uforutsett. En risiko som var veldig aktuell for oss var timeplanen til alle 7 gruppemedlemmene, og vanskeligheten med å få samlet alle til enhver tid. Samtidig så er det veldig kaotisk med 7 stk. som skal arbeide på samme prosjekt, da dette kunne medføre at noen arbeidsoppgaver ble oversett. Det kunne oppstå misforståelser blant medlemmene, eller at det ble antatt at noen gjennomførte dem.

4. Vi har også utviklet, og forbedret kommunikasjonen i gruppearbeid.

- Vi har ved gjennomføring av prosjektet fått en større forståelse og respekt for kommunikasjonen innad i gruppen, og viktigheten med å ha god kommunikasjon mellom medlemmene. Som nevnt tidligere kunne arbeidsoppgaver ha blitt oversett grunnet dårlig/lite kommunikasjon innad i gruppen. Løsningen på problemet kom av kulturen innad i gruppen. Vi hadde en lav-terskel kultur innad i gruppen, noe som gjorde det enkelt å innrette problemet og forlange bedre kommunikasjon fra samtlige medlemmer. Vi tar med oss denne kunnskapen og forståelsen videre til fremtidige prosjekter, og vet nå hva som kan komme av dårlig kommunikasjon.

5. Og ikke minst har vi høstet av det gode gruppesamarbeidet vi har hatt, med god og konstruktiv arbeidsmoral.

- Det å jobbe i grupper hvor gruppesammensetningen kun bidrar til god stemning,

gjør at gruppearbeidet blir morsommere. Terskelen for å komme med innspill og skape diskusjoner rundt innhold i oppgaven har vært svært lav, noe som har bidratt til at alle gruppedlemmene har blitt hørt og føler en form for eierskap til oppgaven.

Det kritiske øyeblikket ved læringen i forhold til oppgaven var helt i starten. Vi som gruppe kunne ikke starte eller gå videre med prosjekter før alle var innforstått med hva AI var og hvordan det fungerte. Samtidig var vi alle nødt til å sette oss inn i muligheter og risikoer ved å benytte AI i prosjektstyring, for å kunne løse oppgaven best mulig.

Noen ting sitter igjen fra tidligere gruppearbeider, og noe spriker fra hva teorien sier om prosjektarbeid. Blant annet det å måtte ha en prosjektleder fant vi ut ikke var nødvendig i det hele tatt. Vi ble ganske tidlig enig om å kjøre en flat og åpen organisasjonsstruktur grunnet viktigheten av gjensidig avhengighet. Vi var alle avhengige av at oppgaven ble løst, og at arbeidet ble gjort. Dette trenger man ikke nødvendigvis en prosjektleder for å få til, da vi følte at vi alle hadde ganske god kontroll på egne kunnskaper og hva vi har og bidrar med i gruppearbeid. Samtidig førte dette til at det ikke var like god arbeidsflyt igjennom semesteret, og forholdet til prosjektplaner burde absolutt være bedre inn mot fremtidige prosjektoppgaver.

Vi føler som gruppe, at vi har hatt et lærerikt og utfordrende semester i Praktisk prosjektledelse, og at viktigheten rundt kommunikasjon og koordinering tidlig i prosessen ikke kan understrekes nok! Vi har nytt godt av den gode gruppesammensetningen, men at roller innad i gruppen kanskje bør defineres bedre, selv med en åpen kommunikasjons- og ledelsesstruktur.

Group 1789

Reflection on learning and unlearning

The journey of a project, from its start to completion, is often filled with opportunities to grow, adapt, and develop as an individual and as a team member. In this section, we will

delve into the experiences and lessons acquired throughout the entire process of the project. Specifically, we will focus on the aspects of learning and unlearning that played a pivotal role in overcoming challenges and achieving success.

What we learned	Explanation
Practical Application of Management Tools	One of the essential lessons learned was the importance of using management tools not only in theory but also in practice. By actively employing these tools in our day-to-day project work, we were able to streamline processes, improve communication, and ensure a more efficient project execution.
Focusing on the Critical Path	We learned to identify and prioritize the critical path in our project timeline. This allowed us to allocate resources more effectively and ensure the timely completion of tasks with the most significant impact on the project's overall success.
Conducting Semi-Structured Interviews	The project provided an opportunity to refine our skills in conducting semi-structured interviews. This enabled us to gather valuable insights and information from various stakeholders while maintaining flexibility to explore emerging themes and topics.
Rapid Knowledge Acquisition	Throughout the project, we were faced with the challenge of gathering knowledge from multiple sources in a short period of time. Through this experience, we developed techniques for efficiently researching, synthesizing, and applying the information we gathered, thereby improving our ability to make informed decisions.
Risk Assessment	The project also taught us the importance of conducting risk assessments and planning for uncertainties. By identifying potential risks and developing contingency plans, we were better equipped to navigate unforeseen challenges and mitigate their impact on the project's success.

Table 5: Overview of what we learned

Where learning was critical

Throughout the project, there were several instances where learning played a critical role in ensuring its success. Early in the project, we realized that our current organizational system was not sufficient for managing the growing complexity of tasks. This realization prompted us to learn and implement new project management tools, which significantly improved our ability to coordinate work, track progress, and communicate effectively. Learning to do a proper risk assessment was also critical at the beginning of the project. Further into the project, we encountered several unforeseen challenges and uncertainties. Learning to conduct risk assessments and develop contingency plans enabled us to proactively address these issues and minimize their impact on the project. This learning experience was essential in building resilience and ensuring the project’s success, despite the unpredictable nature of the work.

What we needed to unlearn	Explanation
Discarding Rigid Planning Approaches	Traditional, fixed project planning methods were not suitable for a dynamic project with changing requirements. Unlearning rigid planning approaches and embracing more flexible, adaptive methods allowed us to better respond to emerging challenges and opportunities.
Abandoning the "Lone Expert" Mindset	It is crucial to unlearn the belief that only one person holds all the answers.

Reassessing Communication Styles	As communication plays a vital role in project success, unlearning outdated or ineffective communication practices is essential.
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Letting Go of Micromanagement	Unlearning the tendency to micromanage team members leads us to increased trust, autonomy, and productivity within the team.
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Table 6: Overview of what we needed to unlearn

Where unlearning was critical

Early in the project, we recognized that relying on a single expert to solve problems limited the potential for innovation and creativity. By unlearning the "lone expert" mindset and fostering a collaborative environment, we were able to tap into the diverse perspectives of the team, leading to more effective problem-solving and decision-making. As the project progressed, we identified that certain communication practices were hindering information flow and causing misunderstandings. By unlearning outdated communication styles and adopting more effective methods, we were able to enhance team cohesion, ensure all members were well-informed, and ultimately contribute to the project's success.

Group 1980

Refleksjon om læring og avlæring

I løpet av prosjektperioden måtte vi lære en rekke ferdigheter, praksiser og holdninger for å takle de utfordringene som oppsto. For å oppnå suksess i prosjektet måtte vi vektlegge det å lære oss Figma og design, sørge for et godt samarbeid og ha stort fokus på brukervennlighet i applikasjonen. Figma innebar å lære å opprette designkomponenter, designe oppsettet, og hvordan man kobler dette opp sammen. Det var nødvendig å skaffe kunnskap om designprinsipper som fargeteori, typografi og prototyper, som var avgjørende for å lage en visuelt tiltalende og brukervennlig applikasjon.

Læring var kritisk for prosjektets suksess i flere situasjoner. For eksempel, da vi designet prototypen, måtte vi sørge for at brukergrensesnittet var intuitivt og lett å bruke. Dette krevde at vi måtte tilegne oss ny kunnskap om designprinsipper og brukervennlighet. For å lage en brukervennlig applikasjon måtte teamet skaffe seg en forståelse for hva som gjør en applikasjon brukervennlig. Dette involverte å lære å designe brukeropplevelser, skape intuitiv navigering og prioritere viktige og foretrukne funksjoner. Her har blant annet YouTube vært til stor hjelp.

For å forbedre designet og brukervennligheten på prototypen, ønsket vi tilbakemeldinger fra sluttbrukeren. Dette ble gjort ved at vi sendte ut spørreundersøkelser, men også satt oss ned med brukeren og observerte hvordan de interagerte med prototypen. Av den grunn måtte teamet også lære seg hvordan spørreundersøkelser og brukertester fungerer. Da tok vi inspirasjon fra lignende undersøkelser og brukte deres erfaringer til å optimalisere vår type tester.

I tillegg var samarbeid og kommunikasjon viktig for å oppnå suksess, spesielt siden det var fem designere som jobbet på prototypen. For å oppnå dette, måtte teamet lære teknikker som smidig utvikling, som fremmet kommunikasjon og samarbeid på tvers av teamet. Da brukte vi pensumboken “Veien til suksess”, relevante artikler på nett og tidligere erfaringer for å få et best mulig teamarbeid. Dette førte til en mer smidig og effektiv arbeidsprosess.

Teamet opplevde at det å avlære kan være vel så viktig som å lære, når det gjaldt å takle utfordringer i et prosjekt. Noen holdninger, praksiser eller kunnskaper kan måtte forkastes eller anses som utdaterte i løpet av et prosjekt. Vi lager ofte antakelser basert på våre tidligere erfaringer eller tro, men disse antakelsene kan noen ganger hindre vår evne til å se ting objektivt. Det å avlære antakelser kan hjelpe oss med å ha en positiv og objektiv tilnærming til utfordringer og til å finne nye løsninger. (Marques, 2007)

I begynnelsen av prosjektet var det uenighet i teamet om hvordan tidsplanen skulle settes opp. Noen ønsket å jobbe intenst og effektivt nær innleveringsfristen, mens andre ville arbeide jevnt gjennom hele perioden. Etter diskusjoner internt i teamet, ble det enighet om at intensivt arbeid rett før fristen ikke ville fungere for dette prosjektet. Det var derfor kritisk at de teammedlemmene som hadde denne vanen, avlærte den og heller jobbet jevnt og trutt gjennom hele prosjektet for å oppnå suksess. For å få en jevn arbeidsbelastning måtte teamet planlegge prosjektet og arbeidsoppgavene, og prioritere prosjektet nok i hele perioden

Det kan være nyttig å avlære behovet for å få viljen sin, og heller være åpen for tilbakemeldinger og samarbeid, da dette kan føre til bedre resultater. Da teamet vårt bestod av ni medlemmer med ulike erfaringer og synspunkter om hva som var den beste måten å lage applikasjonen på, måtte vi finne en felles plattform for å inkludere alle. Noen hadde mer erfaring enn andre når det kom til applikasjonsutvikling, og kunne da gi konstruktive tilbakemeldinger til de mindre erfarne for å hjelpe dem å forbedre seg. Samtidig måtte de mest erfarne også forstå at de ikke alltid kunne velge den løsningen de mente var best, fordi

da ville ikke alle på teamet være enige. Derfor var det viktig å ha et åpent sinn og vurdere andre perspektiver, i stedet for å stå fast på sin egen ide.

Å avlære gamle vaner og antakelser kan være avgjørende for suksess i et prosjekt, da det kan hjelpe oss med å se ting objektivt og finne nye løsninger. I vårt tilfelle var dette sannsynligvis kritisk for prosjektets suksess i situasjoner der tidligere antakelser og løsninger ikke fungerte, og en ny tilnærming var nødvendig. For eksempel, hvis teamet først antok at en bestemt funksjon var avgjørende for applikasjonens suksess, men brukertesting viste noe annet, var avlæring av denne antakelsen og omstilling til en ny løsning kritisk for prosjektets suksess.

Alt i alt har prosjektet hjulpet oss med å skaffe verdifull kunnskap og ferdigheter innen design, brukervennlighet, brukertesting, Figma, kommunikasjon og samarbeid. Vi tror disse lærdommene vil være nyttige i fremtidige prosjekter også. Ved å være åpne for nye ideer, taklet vi ulike utfordringer og tilegnet oss nye verktøy for å oppnå suksess i fremtidige prosjekter.

Group 1998

For å kunne gjennomføre prosjektet var det nødvendig å tilegne seg ulik lærdom, de mest essensielle var:

Lærdom	Begrunnelse
Identifisering av interessenter	Bidrar til at prosjektteamet kan forstå hvem som har påvirkningsevne på prosjektet, og hvem som berøres av det.
Gjennomføring av risikoanalyse	Gjør at man kan identifisere og analysere ulike risikoer som kan påvirke prosjektet, samt utvikle en plan for å håndtere dem.
Utarbeiding av spørreundersøkelse	En ryddig og oversiktlig spørreundersøkelse er avgjørende for å innhente god data om testpersonenes oppfatning av produktet. Spørsmålene må utformes slik at de vil gi meningsfulle svar av relevans for prosjektets formål.
Fordeling av oppgaver og ansvarsområder	En klar fordeling vil definere hvem som står ansvarlig for de ulike oppgavene, noe som vil sikre at prosjektet fullføres innen tidsfristen.
Presentering av resultater	Resultatene må presenteres på en klar og tydelig måte, slik at interessenter kan forstå betydningen av dem.
Prosjektnedbrytning	Å bryte ned prosjektet i mindre deler og pakker vil bidra til å gjøre det mer håndterbart. Dette kan bidra til at teamet kan fokusere på ett område om gangen, noe som øker effektiviteten.
Konkretisering av suksessfaktorer	At prosjektet har bestemte, definerte suksessfaktorer vil hjelpe teamet å måle fremdriften og dermed sikre at prosjektet er på rett spor.
Utarbeiding av tidsplan	En godt utarbeidet tidsplan med milepæler og leveringsfrister sørger for progresjon og at prosjektet ferdigstilles i tide.
Utarbeiding av kommunikasjonsplan	En kommunikasjonsplan som inkluderer hvordan kommunikasjon innad i teamet skal foregå bidrar til å redusere misforståelser og sikrer enighet i teamet.

Når man gjennomfører et prosjekt kan det være nødvendig å avlære seg enkelte vaner, rutiner og kunnskap. Årsaken til dette er at det kan være nødvendig å utvikle nye ferdigheter og tilnærminger for å sikre prosjektsuksess.

Vaner/Rutiner/Kunnskap	Begrunnelse
Mikrostyring	I et prosjektarbeid er det viktig å ikke mikro styre, men heller stole på at teammedlemmene gjennomfører oppgavene sine. Dette bidrar til medlemmene får mer frihet og autonomi, som sikrer effektivt arbeid (Parker, Knight, & Keller, 2020).
Fastlåste rutiner	Fastlåste rutiner kan potensielt hindre fremgang i et prosjekt. Det er derfor viktig at teamet er åpne for å eksperimentere med tilnærminger og metoder.
Fokus på individuelle prestasjoner	I prosjektarbeid er det viktig å avlære seg fokus på individuelle prestasjoner, og heller fokusere på felles mål. Dette styrker samarbeid og vil bidra til prosjektsuksess.
Kommunikasjon- og arbeidsrutiner	For å sikre suksess er det essensielt at kommunikasjon foregår på tvers av arbeidsoppgaver. Det var her nødvendig å avvenne seg rutiner hvor det kun var fokus på egne individuelle arbeidsoppgaver.
Tanker og rutiner omkring oppvekking	Spesifikt for dette prosjektet måtte teamet formidle den nye vekkemetoden ved bruk av wake-up light fremfor den tradisjonelle med vanlig vekkerklokke.

Group 3456

Refleksjon rundt læring og avlæring

Under prosjektet har vi støtt på en del utfordringer knyttet til utviklingen av produktet og håndteringen av gruppearbeidet. For å takle disse ulike utfordringene har det vært nødvendig å innhente informasjon fra eksterne kilder, og å diskutere innad i gruppen. Dette har gitt oss erfaringer som har lært oss følgende.

Læring

Kartlegging av popularitet

I startfasen av prosjektet ble vi enige om at vi hadde lyst til å lage et brettspill, etter- som flere av gruppe medlemmene synes dette er en underholdende fritidsaktivitet. For å forsikre oss om at et brettspill hadde potensial til å bli et suksessfullt produkt undersøkte vi brettspillindustrien som en helhet, i tillegg til kartlegging av lokal interesse for brettspill. I

følge en rapport fra Research and markets er den globale brettspillindustrien verdt 18.93 milliarder \$, og ifølge prognosene er det forventet at denne verdien kommer til å stige i de kommende årene [3]. For kartlegging av lokal interesse laget vi en spørreundersøkelse som vi delte i ulike media og sendte til våre kontakter. Her fikk vi bekreftet at det er flere enn oss som deler vår begeistring for brettspill. Dette forsikret oss om at brettspillindustrien vil fortsette å være relevant, slik at et brettspill vil være et produkt av betydning. Gruppen har lært at kartlegging av marked og muligheter er et kritisk steg i startfasen av et prosjekt, for å sørge for at produktet har potensial til å bli en suksess. Direkte kommunikasjon med interessentene gjennom spørreundersøkelse og brukertesting har vært en kritisk faktor i vår prosess.

Spilldesign

For selve designet av Spindelvevet måtte vi gjøre undersøkelser ettersom ingen på teamet hadde erfaring med å utvikle egne brettspill. Vi søkte på diverse forum og nettsider for å finne inspirasjon til fremgangsmåte for å utvikle brettspill. Dette var et viktig steg for å sørge at spillet blir gøy å spille, balansert, innovativt, og at det skal være like underholdende og spilles om igjen. Vår prosess med utviklingen av Spindelvevet ble idemyldring, bestemmelse av tema, design av spillmekanismer, lage prototype, og testing. Vi kom frem til at det beste var å fokusere på testingen ettersom vi ville ha et spill som appellerer til en stor målgruppe. Deretter kunne vi endre på spillmekanismene og designet ut ifra tilbakemeldingene vi fikk. Dette har ført til at vi lager et produkt som appellerer til forbrukerne.

Visjon for produkt

For å realisere spillet vårt ville neste steg vært å publisere spillet til offentligheten. Ettersom utgivelsen av et brettspill er kritisk for levetiden til spillet, er dette en viktig faktor for å forsikre at Spindelvevet blir en suksess i neste fase. Gruppen har undersøkt muligheter for å publisere spillet. Vi kom frem til at det er to aktuelle måter å gjøre dette på; ta kontakt med en etablert aktør, eller å utgi spillet selv. Ved å bruke en etablert aktør ville vi redusert personlig risiko og økt sjansen for at Spindelvevet vil bli en realitet, ettersom folk med mye mer erfaring ville tatt over prosjektet. Dette er vår foretrukne fremgangsmåte, men det finnes ingen garantier for at en aktør vil utgi vårt spill. Dersom dette skjer, ville vi satset på å utgi spillet selv. Her ville fremgangsmåten vært å prøve og finne en illustratør og en grafisk designer, starte en kickstarter for å tilegne oss økonomisk kapital, og finne et selskap som kan produsere våre komponenter. Nettsteder som "boardgamesmaker.com" ville hjulpet med produksjonen, ettersom dette er en nettside som produserer komponenter til brettspill ut

ifra eget design. Til slutt ville vi spurt lokale butikker om de ville solgt v'art produkt, eller solgt det gjennom en egenutviklet nettside.åha en tydelig visjon for produktets fremtid har vært til stor hjelp under utviklingsprosessen, da dette gir en konkret vei for videre utvikling av produktet.

Avlæring

Testing av spill

Påforh'and trodde vi at et spill med et komplett visuelt design ville være mer appel- lerende for testgrupper, siden det gir et mer profesjonelt inntrykk og vekker interesse for spillet. Etteråha lært mer om spilldesign ble det klart at i testfasen ville det være mer hensiktsmessigålage en enkel prototype. Dette gjøres foråse om mekanismene i Spindelvevet fungerer som forventet, og det vil redusere tiden brukt forågjøre endringer basert påtilbakemeldinger. Denne tilnærmingen ble klar tidlig i prosjektet, noe som har sørget for at spillet ble mer balansert og at utviklingsprosessen ble mer effektiv. I en hektisk studiehverdag har effektiv tidsutnyttelse vært kritisk for prosjektets suksess.

Arbeidsprosess

Basert påtidligere erfaringer har det ikke vært et stort behov for streng oppfølging av fremdriftsplanen, ettersom dette har vært regnet som en selvfølge. I utgangspunktet hadde gruppe medlemmene høy tillit til hverandre, og det ble ikke utarbeidet en kon- kret samarbeidsavtale. Som nevnt i seksjon to oppsto det noen hendelser som p'avirket gruppearbeidet og utviklingsprosessen, og førte til svekket tillit og lavere motivasjon. Dette har ført til at vi først år viktigheten av en samarbeidsavtale, som vi påforh'and trodde var unødvendig. Under gruppearbeid ved senere anledninger kommer vi tilåha fokus p'å å utarbeide denne foråeffektivisere samarbeidet.

Group 6661

Refleksjon over læring og avlæring

Tilegnet kunnskap

En av de første tingene vi m'atte lære var pensum i praktisk prosjektledelse. Dette var nødvendig b'åde foråkunne gjennomføre prosjektet og foråkunne bruke det i spillet. Ved at

gruppa var delt opp i mindre grupper for å lage spillet, lærte man pensumet knyttet til sin del ekstra godt. Alle måtte likevel sette seg inn i alle delene for at det skulle være mulig å hjelpe hverandre, og for å kunne testspille delene.

Å lære prinsippet bak et morsomt Escape-room spill var kritisk for prosjektet vårt. Hvordan gjøre en oppgave krevende, uten å være frustrerende er en oppgave mange spillere ikke kan slite med, gruppa vår inkludert. Vi fant at kunnskapen man kan oppnå ved å dele ideer med noen som har helt andre forkunnskaper er uvurderlig for hurtig prototyping av oppgaver og løsninger. Gjennom diverse spilltester lærte gruppa mye om hvordan gjøre spillet mer morsomt og lettere tilgjengelig for alle, ikke bare tidligere Escape Room spillere.

Det å jobbe i en stor gruppe ga oss en mulighet til å lære mer om samarbeid. Vi opplevde prosjektet som en lærerik opplevelse hvor vi lærte å samarbeide med andre med ulike perspektiver og erfaringer, samt å jobbe sammen for å nå felles mål. Vi ser også nytten av disse erfaringene vil være til stor hjelp i fremtidige samarbeidssituasjoner både i skolesammenheng og i arbeidslivet. Ved å samarbeide med mennesker man ikke kjenner fra før, må man stole på at alle gjør sin del og kommuniserer ved klarheter. Vi utnyttet hverandres styrker og lærte av hverandre, for eksempel lærte noen av gruppedeltagere å lage en god fremdriftsplan og viktigheten av å følge den. Viktige tilegnede punkter fra prosjektarbeidet:

- Pensum i faget praktisk prosjektledelse
- Produktutvikling
- Å diskutere med gruppedeltagerne for å komme frem til den beste løsningen
- Stole på hverandre

Avlært kunnskap

Gruppedeltagerne har mye erfaring med å jobbe individuelt og i mindre grupper. Det vi har lært i tidligere prosjekter, kunne i dette tilfelle være en hindring for prosjektets fremgang, og noe vi derfor måtte avlære oss. Det å jobbe i en stor gruppe var en utfordring, spesielt siden vi var vant til å ha full kontroll over oppgaver vi tidligere har hatt i skolesammenheng.

Ettersom vi delegerte oppgavene i dette prosjektet mellom de ulike prosjektdeltagerne måtte vi gi fra oss kontrollen. Dette kunne oppleves vanskelig, spesielt siden vi ikke kjente hverandre fra før og ikke hadde samarbeidet sammen tidligere. Dette krevde at vi hadde tillit og tro på at alle ville utføre oppgavene på en tilfredsstillende måte. Det krevde også å åpen

og ærlig kommunikasjon om eventuelle problemer som oppsto underveis, slik at man kunne lære av hverandre og løse de sammen.

Siden vi var en stor gruppe som ikke har jobbet sammen tidligere, hadde vi ulike ambisjoner for faget. Før oppstart av prosjektet diskuterte vi derfor målforståelse for prosjektet, og ble enige om hvordan vi ville arbeide med prosjektet og hva vi ville oppnå. Ved å sette et klart mål for prosjektet visste gruppedeltagerne hva som var forventet av hverandre. Det ble enighet i gruppa om å jobbe for oppnået prosjekt med god kvalitet og karakter. For dette ble noen av gruppedeltagerne nødt til å legge inn mer innsats enn tiltekt. Ved ulikt engasjement måtte også mest engasjerte passe på at de ikke tok over andres oppgaver i prosjektet. For å sikre godt arbeid med prosjektet måtte alle ha en felles forståelse for normer som gjaldt innad i gruppa.

Viktige punkter som måtte endres eller avlæres for et vellykket prosjekt:

- Gi fra seg kontroll
- Tilpasse seg en felles målforståelse
- Normer for hvordan man skal jobbe med prosjektet

Group 7777

Reflection on learning and unlearning

1) Gjennom prosjektperioden har vi opplevd et vanvittig læringsutbytte, og læringskurven har til tider vært brå. Vi har måttet tilegne oss en rekke ferdigheter og holdninger for å håndtere diverse utfordringer underveis. Innledningsvis hadde ingen av oss nevneverdig erfaring knyttet til prosjektarbeid. Prosjektledelse og prosjektorganisering var derfor praksiser vi ble nødt til å studere og anvende for å oppnå ønsket suksess. Vi lærte at en godt tilpasset organisasjonsstruktur var avgjørende for å sikre riktig prestasjonskultur, med motiverte prosjektmedlemmer som føler stor grad av selvstendighet og eierskap til prosjektet. For oss fungerte en flat struktur basert på funksjon, med uavhengige lag, svært godt. Læringsbyttet var av denne grunnen også svært ulik innad i gruppen.

Programutviklingslaget opplevde i større grad teknologisk læringsutbytte. Sentralt for å lage den visuelle prototype av applikasjonen, var bruk av programmet Adobe XD. Denne programvaren krevde ikke omfattende innføring, men det var likevel nødvendig å ta et dypdykk etter diverse «tips&tricks». Mer avgjørende for utviklingen av applikasjonen, var

kunnskap om design- og strukturelle prinsipper, fargeteori, typografi og ulike konsepter for brukergrensesnitt. Dette innebar å lære hvordan ulike virkemidler, som farger, kontraster, struktur og typografi, påvirker helhetsinntrykket for å få et brukervennlig, intuitiv og visuelt tilfredsstillende design. For applikasjonens funksjon, stod kunnskap om grensesnittmetaforer, prinsipper for begrensninger, synlighet, mapping og konsistent utforming [9], sentralt. Ved tilbakemeldinger på flere iterasjoner av applikasjonen, lærte vi å lytte til brukernes faktiske behov framfor egne tanker om ønsket funksjonalitet. Det var viktig at de essensielle funksjonene ble prioritert først, og andre nyttige funksjonene kom senere. For oss var dette en ny måte å tenke på og nye prioriteringer å ta hensyn til. Arbeidsoppgavene til de resterende prosjektmedlemmene omhandlet i stor grad om kommunikasjon utad. Læringsutbyttet for disse fagenhetene var knyttet til blant annet kommunikasjonsstrategier, kundebehandling, leverandørbehandling, samt markedssegmentering og -kartlegging. Denne delen av entreprenørskap var helt nytt for oss. Dialog med markedsaktører har vært avgjørende for gruppen for å forstå applikasjonens posisjon i markedet og identifisere mulige samarbeidspartnere og konkurrenter. Dette har igjen ført til utvikling av en strategi som sikrer at appen kan tilby verdi som skiller seg fra resten av markedet. Gjennom å segmentere markedet, har gruppen kunnet tilpasse appens funksjonalitet og brukervennlighet for å møte de ulike behovene til de forskjellige målgruppene.

2) For oss har læring hatt en mer sentral rolle i prosjektet enn avlæring, likevel var det enkelte tankesett, holdninger og vaner som måtte avlæres underveis. Det ble tidlig klart at vi verken hadde kapasitet, ferdigheter eller tid til å programmere en fullverdig applikasjon. I forbindelse med denne endringen i prosjektmålet, ble det tydelig at vi måtte avlære tankesettet om at alle oppgaver kan gjøres fort og på en perfekt måte. I stedet vil det være nødvendig å ta en gradvis og hensiktsmessig tilnærming, hvor man jobber med de mest kritiske oppgavene først og sørger for å ferdigstille disse før man går videre til neste oppgave. Det har vært viktig for oss å jobbe for å skape en kultur hvor man kontinuerlig evaluerer og forbedrer prosessene sine, og bruker tid og ressurser på å lære av feilene sine, lytte til andre og implementere forbedringer.

Som en prosjektgruppe på åtte studenter, har det som nevnt tidligere vært nødvendig med en flat funksjonell organisasjonsstruktur, der flere lag jobber noe uavhengig av hverandre. Vi har derfor blitt tvunget til å avlære tanken om at alle må ha full kontroll på alt som skjer til enhver tid. I stedet har vi forsøkt å bygge en kultur basert på selvstendighet og eierskap til prosjektet, hvor man jobber som et team for å oppnå felles mål. Det er ikke alltid

hensiktsmessig at alle beslutninger må tas av én leder eller et begrenset antall autoritære. I stedet vil det være viktig å oppmuntre til initiativ, diskusjon og kreative løsninger blant prosjektmedlemmene og å ta beslutninger i fellesskap.

Group 8587

Refleksjon av læring

I løpet av prosjektet og utviklingen av prototypen, møtte gruppen på flere utfordringer. For å kunne skape et vellykket prosjekt, og løse disse utfordringene underveis, måtte informasjon og kunnskap fra flere kilder innhentes. Nedenfor følger ulike måter gruppen hentet ny data og kunnskap på, samt egenskaper medlemmene måtte tilegnes i løpet av prosessen.

6.1 Spørreundersøkelser

For å kunne utvikle en nettside som skal hjelpe brukere med å planlegge matinnkjøp basert på ukentlige tilbud, måtte gruppen først få en dypere forståelse av matvanene, innkjøpsvanene og pengebruken til potensielle brukere. Det ble gjennomført en spørreundersøkelse som var rettet mot studenter. Undersøkelsen ga verdifulle innsikter om deres matvaner, hvordan tilbud påvirker deres valg av matvalg, og hva slags funksjoner de ønsker seg i en app som skal hjelpe dem med å planlegge og handle mat. Denne informasjonen var avgjørende for å kunne utvikle produktet som møter brukernes behov og forventninger på den best mulig måte.

6.2 Nettside

En av de mest fremtredende utfordringene som ble møtt under utviklingen av prototypen, var mangelen på erfaring og kompetanse innen webutvikling. Gruppemedlemmene hadde tidligere arbeidet med grunnleggende Python-koding, men for å realisere nettsiden var det nødvendig å utvide kompetansen til å inkludere HTML og CSS.

Webutvikleren utforsket et bredt spekter av kilder, inkludert online veiledninger, ressurser og forum, og engasjerte seg i selvstudium for å tilegne seg kunnskap om webutvikling med HTML og CSS. Dette krevde en betydelig investering av tid. Gjennom denne læringsprosessen ble webutvikleren mer komfortabel med HTML og CSS, og kunne etter

hvert bygge en prototype som oppfylte prosjektkravene. Dette har ikke bare vært nyttig for å fullføre dette prosjektet, men det har også gitt faglig kompetanse og forberedt webutvikleren på fremtidige prosjekter der webutvikling kan være nødvendig. Koden brukt til å utvikle nettsiden er vedlagt i Appendix C [10].

6.3 Matretter

For å kunne tilby brukerne et praktisk og økonomisk alternativ, var det nødvendig å undersøke de beste tilbudene på matvarer tilgjengelige i butikkene. Mye tid ble brukt på å finne attraktive mattilbud i kundeavisene til forskjellige dagligvarebutikker. Begrensningen ble etter hvert satt til å gi tilbud fra kun to butikker ettersom dette kun er en prototype. Deretter ble det satt sammen oppskrifter som kunne lages med disse matvarene, og det ble beregnet hvor mye penger man kunne spare ved å kjøpe tilbudsvarene sammenlignet med å kjøpe de samme varene til full pris. Opprinnelig var ideen å benytte AI til å automatisk generere matretter basert på tilbudsvarene. Dette viste seg å gi lite kreative matretter og fungerte ikke optimalt. Dermed måtte teamet selv lage matretter og finne inspirasjon fra andre nettsider som MatPrat [Matprat (2023)]. Denne prosessen viste seg å være mer tidkrevende enn forventet, men var en nødvendig oppgave for å kunne tilby brukerne et godt alternativ og demonstrere hvordan de kunne spare penger på matvarekjøp. Dersom produktet skulle videreføres, ville det kreve betydelige ressurser for å lage nye matretter hver uke. Derfor måtte denne prosessen prioriteres høyere enn det som ble gjort under dette prosjektet.

6.4 Brukertest

For å kunne utføre en grundig og effektiv brukerundersøkelse, er det flere ting som var viktig å lære og forstå på forhånd. Først og fremst var det viktig å ha en dyp forståelse av hvem målgruppen er og hva deres behov og ønsker er. Videre var det viktig å kunne utforme spørsmål som er åpne og nøytrale, slik at man ikke påvirker brukernes svar. Det er også viktig å kunne analysere og tolke resultatene på en måte som gir innsikt og kunnskap som kan brukes til å forbedre produktet.

6.5 Endring av tilnærming

I arbeidet med prosjektet, innså gruppen at noen tidligere holdninger, praksiser og kunnskaper var utdaterte og ikke lenger nyttige. Nedenfor er noen av de viktigste praksisene og kunnskapene som måtte avlæres for å optimalisere produktet:

- En av de mest avgjørende lærdommene gruppen fikk var at det ikke er tilstrekkelig å lage et produkt uten å få tilbakemeldinger fra brukere underveis i utviklingsprosessen. Selv om gruppen hadde en god idé og tro på at produktet vil løse et reelt behov, var det viktig å huske at man ikke nødvendigvis har full innsikt i brukernes opplevelser eller preferanser. Dette var kritisk for å levere et vellykket produkt.
- Det ble erfart at å ta initiativ til å gjennomføre arbeidsoppgaver uten å vente på beskjed, var en viktig faktor for å oppnå mer effektiv jobbing i prosjektet. Ved å være proaktiv og vise engasjement, bidro alle til å skape et bedre arbeidsmiljø som økte samarbeidet og motivasjonen blant oss.
- I arbeidet med prosjektet erfarte gruppen fort at spesifikke oppgaver tar lenger tid enn forventet. Det å heller fokusere på å sette klare og realistiske tidsrammer for de enkelte oppgavene, samt være bevisste på å prioritere ressurser og tid på tidskrevende deler. Gruppen måtte dermed endre på holdningen om at ting tar kort tid, noe det ble erfart at mange oppgaver ikke gjorde. Uten dette ville prosjektet ikke kommet i mål i forhold til tidsrammene.

Group 9999

Refleksjon rundt læring og avlæring

1) Læring

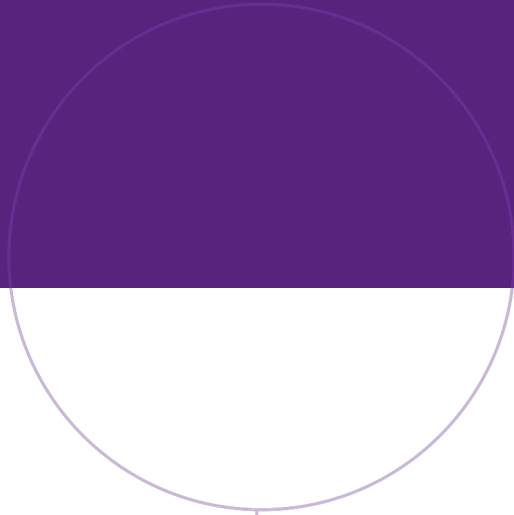
- Planlegging og prioritering: Ettersom alle prosjektmedlemmene hadde forskjellige timeplaner, var det essensielt for prosjektgruppens suksess at alle lærte seg å prioritere tiden bedre. Det var dermed viktig å planlegge uken og arbeidstimene godt.
- Objektivitet: Det var viktig å ikke la egne meninger påvirke tolkningen av resultatene fra undersøkelsen.
- Undersøkelse og Google Skjemaer: For å lage undersøkelsen måtte prosjektgruppen lære

seg å bruke Google Skjemaer til å lage en undersøkelse som var kort nok til at respondenter tok seg tiden til å svare, men som samtidig stilte riktig spørsmål. For å muliggjøre dette måtte alle funksjonene Google Skjemaer tilbyr, læres.

- Evaluering av resultater: Det var viktig å lære seg å kunne tolke resultatene og evaluere de opp mot andre kjente resultater og forskningslitteratur. Dette var viktig for å avdekke suksessfaktorene tilknyttet undersøkelsen.
- Bruken av digitale verktøy: Samtlige i prosjektgruppen måtte lære mer om dagens bruk av digitale verktøy i byggebransjen, hvilket skulle hjelpe oss å tolke svarene fra undersøkelsen.
- Samarbeid og tilpasning: Innad i gruppen var det variasjoner i egenskaper og kvaliteter. Dette må tilpasses, slik at gruppen får utnyttet arbeidskapasiteten. Dette var et viktig læringsmoment underveis i prosjektet.

2) Avlæring

- Organisasjonsstruktur: Vi måtte avlære den eksisterende vennegruppestrukturen til fordel for den prosjektspesifikke. Her måtte prosjektlederen avlæres fra å agere som en av gjengen til å styre gruppa. Dette krevde å stille strengere krav til hverandre, spesielt med tanke på tidsfrister.
- Arbeidsprosess: Vi måtte avlæres med hensyn på arbeidsprosess. Vi var alle vant til å jobbe med egne oppgaver og hadde begrenset erfaring med samspill i gjennomføring av undersøkelser. Ved å jobbe sammen fikk vi muligheten til å idémyldre og diskutere oss frem til en bedre løsning på problemstillingen.
- Man har ikke alltid rett: Det var viktig å avlæres tanken om at en selv alltid har rett og at man går i forsvarsmodus når noen kommer med nye forslag. Resultatet forbedres ved å ta imot forslag og være åpen for forandringer. Dette vil også gi rom og mulighet for alle i gruppen til å dele sin mening. Dermed vil gruppen ta større utnytte av den kompetansen som gruppens medlemmer innehar. Dette vil fremme et bedre resultat og et positivt arbeidsmiljø.



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