A web-based application for ethical competence workshops

Linn Löfquist
Abstract

A web-based application for ethical competence workshops

Linn Löfquist

In our society today, we are dependent on digital solutions in every aspect of our lives. IT-professionals have a great responsibility in their profession and thus they need to be aware of the ethical aspects of their work. This project investigates if an application used as a tool during ethical competence workshops can increase the learning outcome and thus increase ethical competence. An analysis of existing workshop exercises about ethical competence was conducted. Based on the analysis, a web-based application aiming to be user-friendly was developed. The application was tested with a target group of students with similar backgrounds in IT. The usability of the application was measured as well as the ethical competence of the participants. To be able to reach a comparable result a workshop was conducted without the application as well. The results showed that an important factor in acquiring ethical competence is not only a high usability of the application but lies much with the design of the exercises. A favorable design is one that gives the students the possibility to weigh different ways of thoughts against each other.
CONTENTS

1 Introduction .......................... 1
  1.1 Background .................................. 1
  1.2 Ethical Competence .................................. 1
  1.3 Workshop exercises .................................. 2
  1.4 Related work .................................. 2

2 Application demonstration .... 3

3 Process ................................ 7
  3.1 System Design .................................. 7
  3.2 Tools .................................. 10
  3.3 Workshop exercise analysis .................................. 10
  3.4 Design decisions .................................. 12
  3.5 Critical points .................................. 14
  3.6 Theory and expectation .................................. 16

4 Testing and evaluation ........ 17
  4.1 Procedure .................................. 17
  4.2 Usability Study .................................. 18
  4.3 Ethical competence Questionnaire .................................. 18
  4.4 Results and Analysis .................................. 19
    4.4.1 Usability results .................................. 19
    4.4.2 Usability discussion and improvements .................................. 19
    4.4.3 Ethical Competence Results .................................. 21
    4.4.4 Ethical Competence Results discussion .................................. 22

5 Conclusions ..................... 24
  5.1 Future work .................................. 25
  5.2 Concluding thoughts .................................. 25

6 References ....................... 26

7 Appendices ......................... 28

A Application demonstration .... 28
  A.1 Set up .................................. 28
  A.2 Exercise one .................................. 34
  A.3 Exercise two .................................. 42

B Original workshop questions ........ 56
  B.1 Övning 1: Heteronomi - Autonomi Instruktioner .................................. 56
  B.2 Övning 1 Heteronomi - Autonomi .................................. 59
C  Consent form version 1 - without the application 60
D  Consent form version 2 - with the application 61
1 Introduction

1.1 Background

As Information technology’s impact of our everyday life grows rapidly, the need for ethically competent IT professionals increases. IT professionals have a great responsibility and need to have the ability to handle any moral problem that may arise. The wide use and dependency of computers imposes Computer ethics as a field of academic study which was originally founded in the 1940s by MIT professor Norbert Wiener[1]. Computer ethics is not like any other form of ethics. Computer ethics could be described in two parts. The analysis of the nature and social impact of computer technology and the corresponding formulation and justification of policies for the ethical use of computer technology[2]. With the widespread use of information technology new unique ethical issues occurs which do not emerge in other contexts[3]. A policy vacuum arises when a new ethical dilemma occur with the use of computers which has never needed to be addressed before[2]. These policy vacuums needs to be addressed, discussed and policies should be developed for proper conduct. Computer ethics impose problems that can not be solved by simply applying existing ethical theories[2]. Therefore, computer professionals needs to be trained and be able to recognize and handle moral issues in their profession.

A training program in the form of workshops has been developed and applied with the purpose of educating professionals in recognizing and handling moral issues.[4] This education program consists of a 3-days classical workshop with 10-12 participants and at least one day of follow up. The primary focus of the workshops is the difference between heteronomy and autonomy, which is taught by practice on several moral dilemma examples. The training program has four different training blocks with a total of 17 exercises. The different training blocks focuses on ethical awareness, personal ethical skills, organizational principles and processes and on real life application in professional contexts.

This thesis follows the process of the implementation of a web-based application to be used during these workshops. There are two focus points to explore, which extends the implementation of the application. The first is to investigate if using a web-based application during these training programs could improve the experience for the participants and enhance the learning outcome, meaning lead to a higher ethical competence. The second focus is to investigate the usability of the application, since the two are dependent on each other.

1.2 Ethical Competence

Ethical competence is defined as the ability of a person to solve ethical dilemmas. The person confronting the ethical problem should act without moral fixations and emotional or automatic reactions. You can say that a person has ethical competence when she can use the right way of thinking when facing a dilemma depending on the dilemma at hand. Heteronomy is the quick and easy default behavior, for example reacting a certain
way because you just know it is the right way. Another example is following authority without questioning. Autonomy on the other hand can be described as critical thinking and systematically applying different perspectives of relevant values, principles, interests, feelings, duties, beliefs on the dilemma at hand.[5] This does not mean that heteronomy is the wrong way to think but we need to be able to use autonomy where it is necessary and thus we need to train the ability to master autonomy. There are no algorithms for solving ethical dilemmas, so when a moral problem occurs people need to be ready to use the right combination of autonomy and heteronomy. This implies that the person needs to have an in depth awareness of ethical dilemmas to be able to anticipate them before they arise. As well as recognizing one’s own responsibility and acting before the situation gets out of hand. To be able to reach the best outcome for all parties concerned is also an ability an ethical competent person needs to possess. It is possible to train ethical competence, for example with exercises in classical workshops[4] as mentioned above.

1.3 WORKSHOP EXERCISES

The final workshop exercises selected for this tool are a provocative exercise and an exercise about heteronomy and autonomy. The exercises were selected based on the analysis presented in the section Workshop exercise analysis. That is if they could improve the learning possibility and user experience of the workshop, strongly correlated to if there is also a high usability of the application. To test this there is no need to implement all exercises. Only if a possible improvement is identified, the exercise is implemented.

1.4 RELATED WORK

Computer ethics or ethics in combination with computer science is a rather unexplored area by the stereotypical computer scientist and many are reluctant to learn the subject. This is probably because ethics differs much from the classic subjects in computer science. In computer science you can easily apply an algorithm to a set of inputs and it will give you a specific predictable output, if implemented correctly. In computer ethics it is not as straightforward.

There are however tools created with information technology that relates to this thesis. For example Democrate[6], which is a decision making tool developed by Mikael Laaksoharju at CEST - Center for Ethics, Sustainability, and Technology at Uppsala University[7]. The tool aims to aid people in the process of autonomous critical thinking when analyzing an ethical dilemma. With the help of this tool the person facing the ethical dilemma can structure up the stakeholders on the Y-axis and the different possible solutions to the dilemma on the X-axis. The users can then place their different arguments and perspectives at the corresponding place in the system. It is a collaborative tool and you use a session token to save your state. You can vote on other user’s arguments and edit your own. All participants are anonymous. This is purely a decision-making tool and it relates to the thesis since it has the same educational purposes and has been used during computer ethics courses.
2 Application demonstration

This section will demonstrate some important segments of the final application. A more detailed walk-through of all the pages in the application demonstrating how it should be managed can be found in appendix A. The application is intended to be used during a workshop where the teacher view is shown on a screen in full class and each student connects with a computer. The decision to have the application as a tool used during the classical workshops was due to the possibility of discussion among the students. If the students were connected remote instead a big part of the learning outcome would be lost with the lack of discussion and exchange of ideas.

If you want to try the application go to https://github.com/lilo4591/Bachelor-thesis and follow the instructions in the README.md file.

The Figure 1 below shows a snapshot of the first exercise where the students are discussing in their group and adding situations which has no moral implications at all. Initially their arguments are only visible within their group. The teacher decides when the time is up, and all arguments are then shown in full class. The next steps in the first exercise looks the same as in Figure 1 but asks the students to come up with possibilities with war and risks with love.

![Figure 1: Student page: Adding examples to be displayed initially within their group](image)

Figure 2 shows a snapshot of the second exercise where the students have written their thoughts on an initial example. The result is shown in full class on the teacher page.

![Figure 2](image)
The students should formulate their own ethical dilemma to analyze shown in Figure 3. Each group formulates an ethical dilemma together which is relevant to their private life, profession or school.

The Figure 4 shows one of the steps in the analysis where each group can add thoughts to their analysis.
When the students have worked through all steps, they arrive to the page shown in Figure 5 where the group’s analysis is summarized. When they are happy with the result, they can submit the analysis to the teacher and wait for their time to present it.
At the end of exercise 2 the students will vote on the initial arguments shown in Figure 6. The result of the voting is shown in full class.
3 Process

3.1 System Design

The application uses a NodeJS express server which is keeping track of the input from the users of the specific session running. NodeJS is an open source JavaScript runtime environment, which implements the "JavaScript everywhere paradigm"[8]. This unifies web development and you can write JavaScript not only on the client side but also on the server side to produce dynamic web page content. The application is client server built, both the teacher and the students connect to the server as clients. The communication between teacher and students function with the help of sockets. Each student has a socket connection to the server and the teacher as well as shown in Figure 7. The communication between all participants goes through the server. A theme in almost all of the workshop exercises is the initial group division of the students and the focus to work on the exercises in smaller groups, therefore a group functionality is implemented in the application.
A teacher starts a workshop and the students can log in with the session token shown on the teacher’s page in full class. The students are randomly placed in a group, the size of groups is decided by the teacher prior to the group generating. The groups are implemented with the help of Namespaces in socket.io[9]. Namespaces do not provide dynamic assignment by default, so that is implemented on the server side. The group assigning is based on how many students are logged in at the start of the workshop. The group generating makes sure that no student will be alone in a group (apart from if the teacher selects the group size to be 1). If a teacher selects the group size to be 3, but there are 7 students the first group will have 4 students and the second will have 3. There was a discussion about using rooms[9] instead of Namespaces or a combination of them, but it was decided to use Namespaces since it is easier to work with. This means that each student has two socket connections to the server, the initial student connection and one with the group name. This could have been avoided if rooms were used instead.

The implementation of Namespaces raised a concern which was the case of a student arriving late, then he/she would not be able to join a group at all since they are generated at the start of the workshop. This is discussed in the section Critical points. Disconnection is a concern as well, since if the Internet would go down the student will want to still be in the same group. Because of the latter concern it was decided that each student should log in with a username. The username is then connected to the socket id of the connection so in a case of disconnection one could just use the same username when logging in again and thus coming back to the same group. The username should be picked by the student at first log in. The only step where the username is shown to all students is at the beginning of the workshop when the students are connecting and thus anonymity is still ensured. No input is connected to a specific student.
Figure 8: Session object diagram

Figure 8 shows how the data for the application is organized. Each ongoing session of a workshop has this data structure and the server is keeping track of all sessions through an object containing one session object per session. Each session contains an object for each group which in turn keeps track of the connected students belonging to that group but also their input to the different steps of the exercises which is shown under the titles "exercise1" and "exercise2".

This specific example in Figure 8 shows a session with only one group named 1249group0 which has two students, to make it as simple as possible. The two students are part of the list containing all students but also the list of students in their group.
Vote represent one vote on an initial thought on exercise 2 which is about heteronomy and autonomy. Vote is placed outside the group object since the voting is done in full class.

If there were to be more than one group there would be an additional group in the list in under the title Session. Group, exercise1 exercise2 would be needed to be drawn again. The students in the other group would also be a part of the list of students in under the title Session.

### 3.2 Tools

The application uses a NodeJS express server as previously mentioned and the client side is written in JavaScript with the library Vue. The reason for this set up to be selected is accessibility. To develop this application as a website provides simplicity for the user. Rather than having to download and install a program one only needs to browse to a web page. Since I wanted to redirect the user in each step to the next page I took advantage of the library Vue’s routing machine[10], and composed each page as a Vue component[11].

Many problems occurred during the setup of the project. The project was recreated with different tools until the final version. That was a skeleton code basis with a server already set up, this to try to keep the as much focus on the design of the application as possible. To implement the voting the initial thoughts a vue-poll component was integrated with the application[12]. Furthermore some CSS was taken from a Vue CSS tutorial series.[13]

### 3.3 Workshop exercise analysis

The provocative exercise is usually the workshop’s starting point. Thus, it became a natural choice to have this exercise as exercise number one. This exercise challenges the students to step out of their comfort zone and think in other previously unexplored perspectives. Not to accept an ethical truth so hasty. The reason for this exercise to be selected is the possible gains one would have using this exercise in an application where the students are able to be anonymous, since the exercise is so provocative. An example would be to find positive things about child labor. Child labor is against the law in most western countries and thus it is easy using the heteronomous way of thinking to say it is wrong. This probably means that many participants may hesitate to name arguments for child labor to be legal. The fact that the participants add their thoughts anonymously will encourage them to add to the conversation. So, this exercise was selected due to the possibility of broadening the conversation but also take the stress of each individual participant. The provocative exercise is implemented as the first exercise and is divided in three parts, first the students are told to come up with real life events that has no moral implication at all. The second part is to find negative aspects of the ethically correct principle Love. The last part is about finding positive things about the ethically incorrect principle war.

This however does not mean that participants can not be offended. However, if a
participant adds an argument to the conversation which another participant finds offensive, there is no way of knowing who posted the argument and thus no person can come to harm. Since all participants are in the same room it will encourage discussion. This specific exercise gives room for arguments that one would not want the students to miss to think about. These arguments are stored on the server side and connected to the specific questions.

The autonomy and heteronomy exercise appendix B.1 was selected as exercise number two since it gives the student insight in different ways of thinking and is a core element one should learn in ethics. The Heteronomous way of thinking is a when one instinctively react to a moral situation based on what you know is right. You do not have to reflect upon it at all. Autonomy is the opposite, when you use the autonomous way of thinking you seek to find a systematic overview of the situation to explore the different options and weigh them against each other before acting. To be able to differentiate between these two ways of thinking is to become aware of one’s own way of thinking and thus being able to question it. This gives you a good start in acquiring ethical competence and developing skills in autonomy. Therefore, this exercise is an obvious choice.

In the first part of this exercise the students are given a dilemma and are encouraged to adopt the dilemma analyze and add their main thoughts to the application. The students are encouraged to discuss with each other but can still write down their individual thoughts. The ethical dilemma chosen should be a suitable dilemma for the target group. My target group was students currently studying or newly graduated in computer science programs or similar at the university, therefore the following dilemma was chosen. "A student is conducting her master thesis at the university. The thesis is about developing an algorithm used to find vulnerabilities in computer systems. To test this algorithm the student implements a system that uses the algorithm to hack into different companies’ systems. The algorithm manages to find a few vulnerabilities, and this is added to the report. Her professor is both impressed with her ability but also concerned. One of the companies’ security team notices that they have been attacked and can track the attack back to the student and are planning to press charges. But the student however did not do any damage to the companies’ system and claims that she did them a favor, because now they can make their systems more secure."

The initial thoughts triggered by this ethical dilemma are used at the end of the exercise to discuss in terms of heteronomy and autonomy. The application creates the possibility to simply save the initial thoughts and not having to rewrite them when coming back to them at the end of the exercise. The students can step through the initial thoughts and with their newly gained knowledge vote if they believe them to be heteronomous or autonomous. This way all students can participate rather than having only the people usually speaking up control the discussion.

The next step in the original workshop is where the students formulates their own
dilemma which they are facing now in their profession or studies. This part is important to keep also in the application since the practice on only hypothetical problems does not lead to ethical competence in real life situations[14][15].

In the original workshop exercise the next step is to give the students a worksheet shown in Figure 9 below (and in appendix B.2) to write their thoughts, relating to the dilemma they have formulated, on. When implemented in the application the titles were simplified and each box in the worksheet became a page where all participants in a group could contribute anonymously to the discussion. On each of these pages there is also a help tab to explain further. By using this approach, the aim is that the student should not stare blindly at the complex titles but instead focus on answering a much simpler question.

<table>
<thead>
<tr>
<th>Heteronomi</th>
<th>Autonomi</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reflexmässiga tankar</strong> (Dominerad av en automatisk tanke)</td>
<td><strong>Konkreta värden</strong> (Vem berörs och vilka är deras värderingar?)</td>
</tr>
<tr>
<td><strong>Dogmatiska läsningar</strong> (Fixering vid en stor och viktig princip)</td>
<td><strong>Handlingsalternativ och värden</strong> (Vad kan göras? Hur påverkas alla värderingar?)</td>
</tr>
</tbody>
</table>

Figure 9: Heteronomy and autonomy worksheet

3.4 Design decisions

The application is meant to be used during a workshop, as a tool enhancing the experience of the workshops. The aim is to make the application easy to use and thus creating a
more learning friendly environment. Therefore, there are two views, teacher and student. As of now there is no possibility for the teacher to edit the exercises but in the future there should be support for editing the examples of the exercises, so that you can adjust to the specific student’s background. It is important that the examples are based on where the students come from, if they are university students, politicians or professionals. For example a professional should be presented with examples which she can relate to and could occur in their profession otherwise the learning possibility will not be significant[4].

With inspiration from kahoot[16] who uses game pins. A session token is generated and used when the student logs in to the workshop. The teacher logs in and starts a session where the students can join. The teacher can also choose between previously generated sessions. As a natural step in the development process the application was initially implemented without this functionality, the session token was generated randomly and only served as the key for the students to log in. As the development progressed, each session token was connected to a specific session and held the information about which students, groups and inputs that belonged to that specific session. This made it possible to have multiple sessions running at the same time. When the teacher logged in she/he could choose to start a new session or continue with a session which was already generated.

Where there was no immediate understanding of the questions they were rephrased. For example dogmatic fixations were translated to *principles fixations* and explained with an small example. Instinctive thoughts were translated to "Whats the first thing that comes to your mind?". Concrete values were explained with the question "Think about and define the different parties the ethical dilemma concerns and individually write down what their values and interests are." With the keywords: "define the different parties" and "values and interests" highlighted. The last part which was action alternatives were also worded a bit different: "What possible actions could one take and how that effects the values from the previous question?". In each step the students were encouraged to discuss with their group but also told that they individually could write down any thoughts that occurred.

The application needs to be effortless to understand and use to be user friendly, one might need some explanation of the intention of the question so that the student would not get too off track. The wording of a question affects the outcome or interpretation for the student. The intention here is to make it as simplistic as possible without losing the focus. When the students have worked through the four steps: instinctive thoughts, principle fixations, concrete values and finally action alternatives and values in the exercise about heteronomy and autonomy the analysis is concluded nicely in a chart with explanations of where the different steps belong and why, like the original workshop worksheet appendix B.2. Here the students were given an opportunity to revise their analysis before submitting it to the teacher.

When the group submits their final analysis, it is sent to the teacher. This makes
the presentations smoother. The analysis is now presented in full class and the students can present it without having to write out their analysis on the board. Even if they originally presented without showing their written analysis this would mean that the students that are listening to the presentation can more easily follow since all the information is shown.

3.5 Critical points

<table>
<thead>
<tr>
<th>Ideal course of events</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student</strong></td>
<td><strong>Teacher</strong></td>
</tr>
<tr>
<td>3. Students logs in to the session</td>
<td>1. Teacher logs in</td>
</tr>
<tr>
<td>5. Students receive groups and waits for an exercise to start</td>
<td>2. Teacher starts a new session</td>
</tr>
<tr>
<td>7. Students routed to exercise 1</td>
<td>4. Teacher generates groups</td>
</tr>
<tr>
<td>8. Work on exercise 1</td>
<td>6. Start Workshop</td>
</tr>
<tr>
<td>9. Students routed to next step</td>
<td>7. Start workshop Exercise 1</td>
</tr>
<tr>
<td>11. Repeat step 8-10 two times.</td>
<td>9. End discussion and show all groups work</td>
</tr>
<tr>
<td>13. Continue to group Startpage</td>
<td>10. Discuss students answers</td>
</tr>
<tr>
<td>14. Students routed to exercise 2</td>
<td>11. Repeat step 8-10 two times.</td>
</tr>
<tr>
<td>15. Submit thoughts on initial dilemma</td>
<td>12. Continue to conclusion</td>
</tr>
<tr>
<td>16. Continue and discuss the initial thoughts</td>
<td>13. Continue to workshop Startpage</td>
</tr>
<tr>
<td>17. Continue and write a dilemma in groups</td>
<td>14. Start workshop exercise 2</td>
</tr>
<tr>
<td>18. Continue to reflex thoughts</td>
<td>15. Receive thoughts to display to all</td>
</tr>
<tr>
<td>20. Continue to principle fixations</td>
<td>17. Continue to display next step</td>
</tr>
<tr>
<td>22. Continue to concrete values</td>
<td>18. Press Start to show first part of exercise</td>
</tr>
<tr>
<td>24. Continue to possible action alternatives</td>
<td>19. Continue to next step without routing</td>
</tr>
<tr>
<td>26. Continue to display group summary in chart</td>
<td>21. Continue to next step without routing</td>
</tr>
<tr>
<td>27. Discuss and revise summary</td>
<td>23. Continue to next step without routing</td>
</tr>
<tr>
<td>28. Submit summary of analysis</td>
<td>25. Continue to page explaining heteronomy and autonomy and wait for students to submit analysis</td>
</tr>
<tr>
<td>31. Continue to next step and vote on each thought</td>
<td>29. Display each groups summary and have them present it</td>
</tr>
<tr>
<td>32. Students routed to group startpage</td>
<td>30. Continue to next step which displays the initial thoughts</td>
</tr>
<tr>
<td></td>
<td>31. Display votes on each thought</td>
</tr>
<tr>
<td></td>
<td>32. Continue to exercise startpage</td>
</tr>
</tbody>
</table>
During the design process the table above was produced with the aim of finding all possible ways that the application could fail, if not used as intended. The table shows an ideal sequence of events. A warning sign indicates a higher risk of failure. This means that at those critical points the application needs to be fail safe, to make sure that a human error does not trigger unexpected behaviour.

The first warning sign is at step 4 📣, where the teacher generates the groups. The group generating lets the teacher decide how many students should be in each group and requires all students to be connected and logged in to the workshop since the group calculation is based on the total logged in students. If no students are logged in and the teacher tries to generate groups there will be no groups created. To suppress possible errors which could occur with this functionality a regenerate button becomes visible when the groups are generated. The regenerate functionality on the server-side checks if the groups had already been generated and in that case deletes the groups from the server. The students who had already received a group are forcibly disconnected from that namespace and subsequently new groups will be generated.

The next warning sign is at step 5 📣, where the student receives a group. This is critical due to the fact that the student needs to stay on that page until the generating of the groups is complete. If a student updates the page the connection will be lost and the group name will not be sent to that student. Or if the student has received a group and disconnects from the page, then we want that student to be added to the same group when reconnecting. This is solved by saving all the students that has logged in in a group object. If a student disconnects, the group object will be updated and the student id which is connected to the specific socket connection will be deleted but the username will remain. When the student reconnects with the same username, he/she will have a new socket connection which will be the new student id. The username then matches the username without a student id in the group object and thus the student will come back to the same group. This works no matter where the student is located in the workshop when she/he disconnects. If the student disconnects before a group is received the student still needs to log in to the workshop again and the teacher can solve the issue by regenerating new groups when the student is connected again.

The warning sign at step 9 📣 is because the only way for students to go forward in this exercise is based on the teacher routing them. Sometimes a good design choice is to limit the students in what they can so, creating less points of possible failure. However, this puts more pressure on the teacher. The initial title on the button was "Show groups thoughts", this does not imply that the students are routed to a different page if the teacher clicks the button and could cause the teacher to make a mistake. For example, if the teacher were a bit curious about the student’s progress. Thus it was changed to "End discussion and show all groups thoughts" implying that clicking on this button would mean that the group discussion came to an end.
To simplify the chart the steps 8-10 is executed three times with the three different questions in the following order: Situations with no moral obligations, risks with love and possibilities with war.

The warning sign on step 17 △, where the students are to write a dilemma in groups has almost the same issue as the submit summary, if two students writes at the same time and the first student submits prior the other then the other students work will be overwritten. This was taken care of after the workshop testing because of lack of time. The result of that you can read in Usability discussion and improvements.

Continuing to step 28 △, where the students submits the analysis. Since the students are part of a group there is no need for all students to submit the analysis. This was solved by notifying the students in the group that the analysis was submitted and thus not making it possible for them to submit again. But also make sure on the teacher side that if an analysis was already submitted from a group and another one came in from the same group it would be updated, dealing with step 29 △. If a student reloads the page the analysis should still be submitted but if for some reason that should not be the case and a student submits it again it will not cause any harm.

The voting on step 31 △ would initially only work if the teacher had reached that page prior to the students. If a student voted before the teacher had reached the page the vote would not be registered, since the listener was placed on that particular page. This was solved after the workshop testing with saving the data from the students vote on the server and which meant that if a student voted too early then the data would be saved and displayed at the initialization of the teachers vote page.

3.6 Theory and expectation

If students are presented with a tool like this, it will encourage them to write exactly what is on their mind without censoring themselves. Group conformity can thus be avoided, and more perspectives can be explored. Group conformity could be defined as when the individual responses aims towards the norm of the group since the individuals desire the approval from the group and they also believe the group to be right.[17] When educating in ethics or in other subjects which encourages discussion one wants to avoid group conformity. The idea of having an application where the participants can contribute anonymously could cause the students to conform less to the group. Leading to more widespread arguments and thoughts than that of group members not using the application, hopefully causing a broader discussion and thus users of the application will reach a higher level of ethical competence.

Consider the example of being given an exercise and you are being told that you first should come up with ideas and arguments by yourself. When you have done that you are asked to share your thoughts with a small group, where all other participants were given the first step as well. Now when you share your thoughts anonymously with the
other participants you see perspectives which did think of before, but you have no idea who said what. If you were not given the time to reflect individually and ideas from other group members were presented to you directly you would probably unconsciously start thinking in those terms from the start leading to losing some ideas of your own. Without having an application during the workshop, one starts the discussion with the group without reflecting much yourself, you listen to the first person that speaks, and your mind is heading towards the same direction. This leads to the hypothesis that the arguments presented by group members in an application anonymously will disagree more and be more spread out, leading to a higher learning possibility.

However, this hypothesis is based on if there is a high usability of the resulting application. If the application is hard to use, then it will most probably cause more errors and steal focus from the task. A badly designed application can cause stress and impatience which is characteristics known to be poor conditions for a learning environment. Too much focus would go to managing and understanding the application. The ethical competence results are dependent on the usability measurement. If there is a high usability, we also believe to see an increase of the ethical competence results.

4 Testing and evaluation

Due to the lack of mandatory ethics courses in computer university studies and the importance of ethical competence among future IT professionals the target group was students studying computer science or related at the university but also students who had been studying but had recently begun working. An important note was that all participants should have the same background to be able to compare the results from the different sessions. If one were to use participants with different backgrounds and experiences one could not use the same example in the exercises. Most importantly the data gathered would not be possible to compare. Since you would have more or less ethical knowledge based on your work experiences and different study fields.

4.1 Procedure

The tests had 10 participants. They were divided into two groups with 5 people in each. Group one consisted of 4 males and 1 female, with ages 25, 25, 25, 29, 32. Group two consisted of 5 males with ages 23, 23, 25, 26, 26.

The two groups completed the workshops on two following afternoons. The workshop took approximately 1.5-2 hours on each occasion. First the groups were given a consent form to sign. The consent form explained the structure of the test, the expected time and the right to leave at any time but also the fact that the results would be anonymous. The form was printed in two version since the two testing occasions differed from each other, one form with the application appendix D and one form without the application appendix C.
The first group did a classical workshop and thereupon individually answered the ethical competence questionnaire. The second group did the same workshop using the application. That group also gave feedback on the usability of the application, both verbally and by individually filling in a system usability study[18]. The second group individually answered the ethical competence questionnaire[19] as well.

The groups first worked through the provocative exercise and then the second exercise about heteronomy and autonomy. The first group were given the instructions verbally from the test leader and the worksheet was handed out during exercise two. The group using the application, connected with their individual computer and were given instructions through the application. The test leader managed the workshop by showing the teacher page on full screen. Discussion in the groups was encouraged on both occasions.

4.2 Usability Study

To decide which usability scale to use different scales were considered. The AVI-index[20]. Which goal is to measure IT-systems usability and utility. It consists of six different parts; System development, usability, utility, competence, stress and relations. There are three different versions of the tool, one complete version, one short and one simple. When looking into this tool one gets the feeling that it aims towards systems which are used daily by organizations and companies and thus most of the questions would not be relevant for the ethical competence application. The usability study that was finally decided upon was The System Usability Scale (SUS)[18][21]. SUS was created by John Brooke in 1986 and has since become an industry standard tool. It is a reliable tool for measuring usability which consists of 10 questions to be answered with 5 response options from strongly disagree to strongly agree. Since the participants of this study were only to test the application on one occasion and it is not an application which they use in their everyday working life, this was a measurement more suitable for the purpose. Important to note is that usability is not a measurement in absolute sense it must be compared to the context it is in.

4.3 Ethical competence Questionnaire

Ethical Competence Questionnaire-Working Life and Business (ECQ-WLB)[19] is a tool for measuring ethical competence in terms of ethical problem solving and decision making in business. The questionnaire avoids connection to specific moral philosophical theories and focuses instead on the autonomy hypothesis of Piaget.[19] The questionnaire consists of 7 different ethical problems with 4 different response options each. The respondent should place herself as the problem owner and rank the two top response options which she deems the most important to consider when facing this problem.
### 4.4 Results and Analysis

#### 4.4.1 Usability results

The results from the system usability scale were as following:

<table>
<thead>
<tr>
<th>Student no</th>
<th>Total score</th>
<th>SUS-score</th>
<th>SUS-score average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>33</td>
<td>82.5</td>
<td>77</td>
</tr>
<tr>
<td>2</td>
<td>29</td>
<td>72.5</td>
<td>77</td>
</tr>
<tr>
<td>3</td>
<td>29</td>
<td>72.5</td>
<td>77</td>
</tr>
<tr>
<td>4</td>
<td>32</td>
<td>80</td>
<td>77</td>
</tr>
<tr>
<td>5</td>
<td>31</td>
<td>77.5</td>
<td>77</td>
</tr>
</tbody>
</table>

The total score in second column represents the raw score from the ten items in the SUS-questionnaire. These are then translated to a 0-100 scale which is the SUS-score in column three. The average SUS-score was 77 (Standard deviation =4.47). The scale SUS ranges from 0-100.

#### 4.4.2 Usability discussion and improvements

In theory the aim for the usability score to be high was to lay the foundation for a possible high score on the ethical competence questionnaire. So first, let us evaluate the resulting SUS-score.

An Empirical Evaluation of the System Usability Scale was conducted in 2008 by Aaron Bangor, Philip T. Kortum and James T.[22] The Article provides 10 years of SUS-data on numerous different systems in different stages of development. It gives an idea of what an acceptable SUS-score is. The least acceptable is a score of at least 70 and better systems will score from high 70 to upper 80. A system scoring better than 90 are truly superior. Systems scoring lower than 70 should be considered marginal and should be subjected to continued development. Moreover, systems scoring lower than 50 are unacceptable and should cause serious concern. However, a system which has a score of 50 does not indicate that it is half as good as a system with a score of 100. A score of 50 indicates instead a serious issue of usability in that specific system.[22] The article included a figure for interpreting SUS-scores which is shown in Figure 10[22] below. As you can see the score 77 lies just above what is considered good.
We can conclude that the resulting usability score of 77 is low, but it is acceptable when considering that there were some aspects the participants noted could be improved and thus increase the usability. These will be explained below. One also must remember that this is a small test, with only 5 participants. All participants are studying or have studied IT and thus will have good knowledge of computers and of the use of different computer systems. If this had been tested on a group with less experience of computer systems, the score would most likely have been lower.

Multiple issues with the usability of the application surfaced during the workshop. Consistency for example, when the students had started a workshop it was possible to first submit input to be displayed only to yourself and then press a button labeled "submit to group" which made your input visible to your group. However, there were occasions where this was not clear to the participants. If the participant added input to the input field and pressed "submit to group" the input disappeared since the participant had not pressed enter previously. This was easily fixed by merging the pages together so that all input was shown immediately to all group members on the first submission. This way of meeting the users need is a good way when considering user friendliness but it might not be the best for the purpose of the exercise and for the learning outcome. An other way could be to express more specifically the intention in the design of first adding the input individually and then adding the individual thoughts to the group. This can be found in the example described in the Theory.

One would not want to remove the possibility to add the input by simply clicking enter because this was much appreciated by other participants. Some participants found that it was unclear where the total inputs from the whole group were shown, the merging of the pages could also clear that ambiguity.

Furthermore the only way to get to the next step was to press the button "submit to group", but what if you had not added anything, would you want to submit nothing? This was also solved by the merging of the pages as previously mentioned. Some inconsis-
tency in the different exercises were found as well, in the first, you used the "submit to group" button and then waited for the teacher to route you further. While in the other exercise you clicked continue when you finished with one step in the exercise and wanted to go to the next step. This was mostly because people work in different paces and the results from your inputs in the first exercise needed to be shown immediately on the big screen while in the second exercise it did not.

Student wished for edit functions on the input, as of now you can add input and if you want to edit it you have to copy it and edit and submit it again and then delete the old input. The part of exercise 2 where you are to add an ethical dilemma had some issues as well. If one of the group members continues on and then go back to that page, only an empty text area was displayed and if that group member were to press the button "add dilemma" then it will overwrite the ethical dilemma that the group already had entered. This was fixed by adding an event listener for all key presses, which would mean that every time a student edits the ethical dilemma the other student will see what he or she writes in real time. But also making sure that the ethical dilemma remains if you reload the page when the ethical dilemma is already submitted.

Furthermore some spelling mistakes were found and some rephrasing for more clarity for example when the student are to add their own dilemma to analyze, "dilemma" should be "ethical dilemma". Based on all usability issues which are discussed here a better method would have been to test the application prior to the workshop occasion. If so, the now obvious problems with the application could have been avoided and thus the only focus on the main test would be on the ethical competence aspect.

A positive aspect about the workshop with the application was the fact that they seemed more focused than the group who participated in the workshop without the application. The group that did not use the application would many times wander of in discussion about something completely irrelevant while the group who did the workshop with the application only did this once. This can of course just be because of the personality the participants, but I would like to think that an application like this encourages focus and participation in the discussion.

4.4.3 Ethical Competence Results

The results from the ethical competence questionnaire (ECQ-WLB)[19] for the five participants using the application.
<table>
<thead>
<tr>
<th>Item Content</th>
<th>Student no 1</th>
<th>Student no 2</th>
<th>Student no 3</th>
<th>Student no 4</th>
<th>Student no 5</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1: Integrity</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1.2</td>
</tr>
<tr>
<td>Item 2: Cover-up</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1.2</td>
</tr>
<tr>
<td>Item 3: Public relations</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1.4</td>
</tr>
<tr>
<td>Item 4: Discrimination</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td>Item 5: Whistle blowing</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0.6</td>
</tr>
<tr>
<td>Item 6: Fraud</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Item 7: Promise keeping</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>1.8</td>
</tr>
<tr>
<td>Total</td>
<td>11</td>
<td>6</td>
<td>8</td>
<td>5</td>
<td>8</td>
<td>7.6</td>
</tr>
</tbody>
</table>

The result from the five participants in the workshop without the application.

<table>
<thead>
<tr>
<th>Item Content</th>
<th>Student no 6</th>
<th>Student no 7</th>
<th>Student no 8</th>
<th>Student no 9</th>
<th>Student no 10</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1: Integrity</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Item 2: Cover-up</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Item 3: Public relations</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>1.4</td>
</tr>
<tr>
<td>Item 4: Discrimination</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td>Item 5: Whistle blowing</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0.8</td>
</tr>
<tr>
<td>Item 6: Fraud</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>1.2</td>
</tr>
<tr>
<td>Item 7: Promise keeping</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>2.6</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
<td>11</td>
<td>8</td>
<td>12</td>
<td>15</td>
<td>10.8</td>
</tr>
</tbody>
</table>

The total score can range between 0-21. The results show that the participants in the workshop which did not use the application received a slightly higher score. On average score with the application was 7.6 (Standard deviation=2.30) and without the application 10.8 (Standard deviation=2.95).

### 4.4.4 Ethical Competence Results discussion

In theory it was believed that a high usability would lead to an increase in ethical competence among the participants in the group using the application. The results shows that the participants in the workshop without the application had a slightly higher score. However, the individual scores vary much and thus gives the indication that it is not a significant difference between the two results. We can not conclude with certainty that our hypothesis is disproved given this result. To be able to conclude that we need to increase the usability of the application.

One event that could have caused the slightly higher score received without the application is one that differs from the two testing sessions. There was lack of time when the students in the group who did the workshop with the application were to fill in the questionnaires. This could have caused stress which could have affected their answers. This did not occur on the workshop without the application. Also, an important aspect
to consider is that this workshop was only on one occasion. When you are developing skills in ethical competence there are multiple workshops occasions and at least one day follow up. This means that the students will have more time to reflect and thus learn better.

The most probable cause for the lower score of the workshop with the application is the idea that the steps in exercise about heteronomy and autonomy created confusion since it was not until the summary step autonomy and heteronomy was introduced. The workshop exercises were serialized in the application, which is a significant change in design from the original workshop. The aim was to prevent to overwhelm the students with fancy words at the start. However, this might have confused the students more instead of helping them. The students who participated in the workshop without using the application were presented with the worksheet appendix B.1 much earlier and had it throughout the analysis. One could call the workshop exercises without the application a parallel way of learning. This means that one had the whole picture from the start. This is the design aspect of the workshop that differs most from the two testing occasions, other than that the workshop exercise was very much similar in design. Based on these finding one could argue that when dealing with learning ethical competence a good way of learning is to put alternatives against each other. You see the different ways of reasoning much clearer when you are presenting them together and focusing on their differences. For example, "Taking an action because that is according to the law" could easily be weighed against "Just because it is the law does not mean it is always morally correct". The way one comes to these to different arguments is in the first case heteronomous and in the second autonomous and it is easy to realize that. The focus for me was much about designing a user-friendly application and thus these changes were made on the exercise to reflect that caused the workshop exercises to be damaged. I lost a big part of the important design when the exercises were serialized.

It is not the specific arguments that is either autonomous or heteronomous. It is the way we think that are autonomous and heteronomous. In the end of exercise 2 the initial thoughts on the initial dilemma are presented again and the participants are to vote on each thought if they think it is autonomy or heteronomy. Some examples are easy to grasp but some are not. In that situation, there needs to be a teacher who knows what she/he talks about to explain otherwise the point will be lost. This might have been what happened here as well since I am no experts on these matters. However, in this part the design of the implementation did not differ much between the two sessions more that on the session with the application there is a possibility to vote on the initial thought whereas in the other workshop people were only to discuss them in terms of heteronomy and autonomy. The voting functionality might have given the impression the initial thoughts were either solely heteronomous or solely autonomous, which was not the intent. It was more a base to get the participant to engage in the conversation, since all could participate in the voting.

The application was not finished and there were some things that could have been
improved before the tests were executed. However, this was not possible in the time frame that I had. If the application was how I wanted it when tested, it might have been a different outcome. To end up with a more reliable result one would need to test on larger group of participants. The number of students were only 5 and thus it is hard to know if this result is representative, also the students’ previous knowledge about ethics will most certainly affect the results. If one look at the background of the participants in the group without the application, we find that they were older which could indicate that they had more experience and thus a higher ethical competence to begin with.

5 Conclusions

In our society today, the population are dependent on digital solutions. The ultimate responsibility for the systems that are developed lies mainly with large tech companies. Collectively IT professionals has significant voice to impact the direction of the digital development. It is thus crucial that IT professionals which are to work for these companies possesses ethical competence since a great responsibility comes with the IT profession.

Going back the theory, the idea was to develop an application to improve the ethical competence workshops. With IT students or newly graduates as target group. For the improvement to be possible the application needed to have a high usability score, since they are correlated. Without a high score on the usability there will be no possible improvement on the exercises. Too much focus would go to the understanding of how to use an application. However as one can see from the tables in 4.4.1 and 4.4.3 an acceptable score on the usability scale does not guarantee an improvement in ethical competence.

Based on the findings one can see that the participants using the application had a slightly lower score on the ethical competence questionnaire. An answer can be found in the difference of design of the second exercise which is about heteronomy and autonomy. The original exercise steps were performed in parallel. Meaning that all steps were shown to the participant from the start. This was not the case for the application where a step by step approach was implemented. This made the exercise loose some of the focus. The educational aspect was lost in the quest to reach a high user friendliness.

When you serialize the exercise, you leave out important building blocks which is needed for the students to understand the concepts. To be able to see the arguments and their differences next to each other increases the understanding of the concept. The hypothesis that a user-friendly application would also lead to a higher learning possibility is now proved to be wrong. The application had an acceptable usability based on the SUS-score. But we have learned that a user-friendly environment is not the only factor needed for the students to learn better.

Thus we can conclude that when designing an application for educational purposes the design of the exercise is of as much importance as for the application to be user-friendly.
5.1 Future work

One could develop this further and test it on a larger group of students. Even if the results of my testing points to that it is more beneficial to do these workshops without an application, most of the feedback from the users has been implemented. It would be interesting to see if it would make any difference if the application is closer to finish. My wish is that the method should be a bit different with having the students fill in the ethical competence questionnaire prior to the workshop and also fill in an ethical competence questionnaire afterwards with different items. By using this method instead one can compare the results of the questionnaires to see if there was any increase on the scores, leading to increased reliability in the results. One could rule out the risk of some participants having higher ethical knowledge prior to the workshop which would affect the results. All thanks to having a measurement of their knowledge prior to the workshop.

If one were to further develop this project the next step is to add a database where one would store all the exercises, generated input and examples. This would then lead to a possibility to add an edit functionality for the teacher which is a crucial part of the workshop. If the teacher can edit the examples so that they are relevant to other participants than IT-students, makes it possible to use the application with different target groups. The teacher can then also edit the generated arguments and add arguments to the exercises to make sure certain things she/he deem important are not left out. Another idea involves implementing an AI that based on the arguments that people give can generate arguments in the complete opposite, to encourage the discussion and broadening the perspective.

5.2 Concluding thoughts

This has been a good way for me to learn a lot about ethical competence, web development, design with user centered focus and gaining insight on how to set up a user test environment and to analyze the results. I have learned a lot about the specific library Vue in JavaScript and but has far from learned everything there is to know about Vue.

It has been an interesting subject to explore even if the results did not show what we expected. What the cause are for the results is hard to say with complete certainty. I believe however that ethics competence among computer scientists is very much important in our society today because everything is built to rely on computer systems, school systems, banks, companies, hospitals etc. I hope that this will shine a little light on the responsibility one has a computer professional. The participants can bring the knowledge they hopefully gained into their working life. If you always have the ethical perspective on every work that you do, hopefully the world will be a better place in the future.
6 References


7 Appendices

A Application demonstration

A.1 Set up

Initially the teacher needs to log in as shown in Figure 11 to be able to generate a session token. The log in information in the application is the following username "teacher2018" and password "notsecurepassword".

![Teacher page: Log in](image)

Figure 11: Teacher page: Log in

To start a workshop the teacher presses the start workshop button which is done in Figure 12 where the button is highlighted.
If the teacher has an existing workshop session connected to their account, the sessions will show up on this page Figure 13. In the example there are no previously generated workshops and thus none is shown. Figure 14 shows how the page would look if previously generated sessions exists.

Figure 13: Teacher page: The teacher can start a workshop or start an existing one.

Figure 12: Teacher page: Teacher starts a workshop
Figure 14: Teacher page: If the teacher had previously generated sessions stored.

When the teacher starts a session, the teacher is routed to this page shown in Figure 15. When a student logs in with the session token their chosen username will be shown on this page.

Figure 15: Teacher page: Page showing which students has connected.

Now the students can log in since a session token is generated. When a student logs in their page looks like in Figure 16 and 17.
When the student has logged in the student arrives at the page shown in Figure 18.
Now the teacher needs to generate groups. Figure 19 shows the teacher after deciding to have 2 students in each group.

Now the groups are generated and shown on the page as you can see in Figure 20. A new button pops up making it possible for the teacher to regenerate the groups with a different number, if for example a student is late.
Each student has now received a group and their page is updated accordingly shown in Figure 21. This shows the student Karl-Gustaf’s page and which group he is added to. Now the students can only wait for the exercise to start!

When the teacher has generated the groups, she/he presses the button "start exercise" which is highlighted in Figure 20 and is then routed to the page shown in Figure 22. On this page the exercises are described, and the teacher has a choice to start either one of them. When the teacher starts an exercise, the students connected to this session are routed to the first page of the exercise which is described further in the next section exercise one.
A.2 Exercise one

The first exercise is a provocative exercise for the students to question what is universally ethically correct. The first part of the exercise shown in Figure 23 below. This part is about coming up with situations which has no moral implications at all.

It will not take long before the students to realize that it is very hard to come up with situations which has no moral implications at all. In Figure 24 below the teacher can press the button for the discussion to end and all arguments will pop up on the teacher’s page and they go through it in full class. The teacher can visibly delete the arguments to show that there are no situations which has no moral implications.
Figure 24: Teacher page: To end the discussion the teacher presses the button

When the button is pressed all groups examples will show up on the teacher’s page shown in Figure 25 below. The students are routed to the page in Figure 26 where they can no longer add examples.

Figure 25: Teacher page: The situations are shown and can be deleted by the teacher
The next steps in the exercise work in the same way as described above and is shown here in Figures 27 - 39. For the following two exercises there are previously generated risks with love and possibilities with war, which is located on the server side, these risks and possibilities you can see in Figure 29 and 35. To make sure that the students do not miss some important arguments.
Figure 28: Teacher page: wanting to show risks with love

Figure 29: Teacher page: showing risks with love
Ethical Competence Workshop

Student Page

Ethical awareness, risks with love

Please have a look at the bigger screen and discuss your risks. When you the teacher tells you it is time for the next step in this exercise press continue.
You can not add more risks now.

Continue ➤

Figure 30: Student page: Discuss the risks in full class

Ethical Competence Workshop

Teacher Page

Ethical awareness exercise

This exercise is about identifying possibilities with war.

End the discussion and show all groups' possibilities

Possibilities with war

Continue ➤

Figure 31: Teacher page: Identify possibilities with war
Figure 32: Student page: Identify possibilities with war

Figure 33: Student page: Identify possibilities with war
Figure 34: Student page: Identify possibilities with war

Figure 35: Teacher page: Show all students possibilities with war
Figure 36: Student page: Discuss possibilities in full class

Figure 37: Teacher page: Concluding the first exercise
A.3 Exercise two

The teacher presses the button "start exercise two" and the students are routed to the page at Figure 40. The initial example is chosen carefully to relate to the students occupation or studies.
The teacher page shown in Figure 41 is very similar to the student page but there is no possibility to add arguments. When the student enters arguments, they will show up in real time on the teacher page. When the students feel satisfied with their contribution they can press continue and come to the page shown in Figure 42.
When the initial example is discussed some more in full class the teachers continues and presents the next step in the exercise which is shown in Figure 43.

The students’ needs to press continue to come to the ethical dilemma page shown in Figure 44. Here they should discuss in their group and come up with an ethical dilemma relevant to them, for example a problem they can face in the future or are facing now. The dilemma is updated in real time so when one student writes the other students in his or her group are updated. When the dilemma is submitted, they can also edit the dilemma if they missed something, as shown with an example in figure 45.
When the group are satisfied with their ethical dilemma they press continue in Figure 45. This time the teacher has no possibility to route the student to the next page shown in Figure 47, this was an intentional design choice since groups works in different paces. The teacher can however go the next page shown in Figure 46 and verbally tell the students it is time to go to the next step in the exercise.
The analysis of the ethical dilemma starts, and the students should add instinctive thoughts they think of when considering their formulated ethical dilemma shown in Figure 47. All input which is entered at this stage is only shown to your connected group. The example is shown in red color to differentiate it from the input from the user.

If a student does not understand the question she/he can press the help button shown in top left corner of Figure 47 and the page in Figure 48 will be shown, explaining further the instructions and intent of the question.
When the teacher thinks there is enough time spent on this step on the exercise she/he continues to the next step shown in Figure 49 and verbally instructs the students to continue if they have not already done so.

The next step in the exercise is shown in Figure 50. The student can get help explaining this step as well which is shown in Figure 51.
Figure 50: Student Page: Principle fixations

Figure 51: Student Page: a closer description of what is meant by this step in the exercise

The exercise continues two more steps the same way as the first two steps described above as you can see in Figure 52 - 57.
Ethical Competence Workshop

Teacher Page

SessionToken: 7742

Step 4 of 7

Write down **concrete values** about this dilemma. This is individual but discuss with your group.

Continue ➔

---

Figure 52: Teacher page: Instructing the students about concrete values

Ethical Competence Workshop

Student Page

Discus with your group. Think about and **define the different parties** the ethical dilemma concerns and individually write down what their **values and interests** are.

Enter your values here please...

Submit values to group

These are your group’s stakeholder values.

Example value: is the collaboration with this customer important?

Continue ➔

---

Figure 53: Student Page: Concrete Values
Ethical Competence Workshop

Student Page

This question is about the interests and concrete values of the concerned parties, for example:

Do we want to implement this customer's demand?

There is a risk to leave out relevant arguments here, to eliminate that risk try to first identify all parties which the moral dilemma concerns (groups, companies, people organization, environment, society etc) but always question your conclusions. Discuss in group what values, interests duties feelings etc these parties have. Be critical and prepared to go back and revise your conclusions.

Figure 54: Student Page: a closer description of what is meant by this step in the exercise

Ethical Competence Workshop

Teacher Page

Write down what can be done about this dilemma. This is individual but discuss with your group.

Figure 55: Teacher page: Instructing the students about action alternatives
Ethical Competence Workshop
Student Page

Discuss with your group. Individually write down what possible actions could one take and how that effects the values from the previous question.

Enter your action alternative here please...

Submit action alternative to group

These are your group's action alternatives and their effects.

Example: state an action alternative, how will this affect our reputation?

test

Continue »

Figure 56: Student Page: Action alternatives

Ethical Competence Workshop
Student Page

Instructions explanation

This question is about the different action alternatives one could take and how that will affect the values and interests from previous question, for example

State an action alternative, with this action how are we going to make it financially?

Write all relevant options to act and their effects on the concerned values as they are described in the previous question. There is always a risk to miss a good action alternative, so be prepared to revise the list of action alternatives later.

Go Back

Figure 57: Student Page: a closer description of what is meant by this step in the exercise
The next step the student comes to is a summarized chart that shows where each input belongs shown in Figure 58. The students can now revise their analysis before sending it in to the teacher by adding and deleting arguments.

![Ethical Competence Workshop](image)

**Student Page**

This is a summary of your group's analysis

**Heteronomy:**
- automatic, dogmatic, constrained, instincts and reflexes, authoritarian thoughts.

**Autonomy:**
- critical searching, systematic thinking, supervision, holistic.

You may now revise your analysis

![Figure 58](image)

**Figure 58:** Student Page: all inputs in the four steps are summarized in this chart

When the students are satisfied with their analysis they submit it to the teacher and wait for their turn to present it as shown in Figure 59.
Figure 59: Student Page: A group has sent their analysis

The teacher receives the groups analysis as seen in the lower part of the Figure 60 so the groups can present them on the full screen. The teacher presses the button with the name of the group that intends to present and their analysis will show up on the full screen.

Figure 60: Teacher Page: The teacher receives the groups analyses

When the groups have presented their analysis the last part of this exercise is to go back to the initial dilemma and see if the student have learned anything about heteronomy and
autonomy. The initial thoughts the student added about the initial dilemma is described in terms of heteronomy and autonomy. The student should also initially vote on each thought if they think is mainly heteronomy or autonomy. The voting is shown in Figure 61 - 63.

Figure 61: Student Page: voting on initial thoughts
Ethical Competence Workshop

Teacher Page

Initial Dilemma

With our newly acquired knowledge about heteronomy and autonomy let's discuss the initial dilemma in this exercise.

A student is conducting her master thesis at the university. The thesis is about developing an algorithm used to find vulnerabilities in computer systems. To test this algorithm the student implements a system that uses the algorithm to hack into different companies' systems. The algorithm manages to find a few vulnerabilities and this is added to the report. Her professor is both impressed with her ability but also concerned. One of the company's security team notices that they have been attacked and can track the attack back to the student and are planning to press charges. But the student however did not do any damage to the company's system and claims that she did them a favor, because now they can make their systems more secure.

But she helped them?

Show result

Describe this thought with focus on autonomy and heteronomy.

55

Figure 62: Teacher Page: voting on initial thoughts
The second exercise is now complete.

B Original workshop questions

B.1 ÖVNING 1: HETERONOMI - AUTONOMI INSTRUKTIONER

Mål

Syftet med övningen är att man skall lära sig skilja mellan det heteronoma och det autonoma sättet att tänka när man möter ett moraliskt problem. Detta skall man kunna göra snabbt var man än befinner sig och oberoende av vilket problem det handlar om. Att lätt kunna skilja mellan heteronoma och autonoma tankar är en förutsättning för att man skall kunna ta kontroll över situationen och gå vidare med det autonoma tänkandet.

Instruktioner
Introduktion

Små grupper
1. Formulera ett eget, verkligt och angeläget problem som du möter just nu i ditt arbete eller i ditt privatliv.
2. Definiera konflikten och identifiera problemets moraliska dilemma.
3. Skriv under rubriken “Reflexmässiga tankar” olika sätt att tänka som innebär att du inte vill se eller ta ditt ansvar samt inte vill ta itu med problemet. Skriv flera sådana sätt att tänka som skall vara oberoende av vilken lösning till problemet du vill se.
5. Skriv under rubriken “Konkreta värderingar” alla berörda parters intressen och värderingar. Här finns det en risk att man utelämnar något som är relevant. För att minska denna risk försök först att identifiera alla som berörs av det moraliska problemet (personer, grupper, organisationer, samhälle, miljö etc.) men ifrågasätt ständigt dina slutsatser. Undersök och diskutera sedan i gruppen vilka värderingar, intressen, plikter, känslor etc. dessa sakhållare har som är relevanta i den konkreta situationen, men var kritisk och beredd att revidera dina slutsatser.

Hela gruppen
Presentera resultatet och diskutera hur det heteronoma respektive autonoma sättet att tänka visar sig i de moraliska problemen som de olika smågrupperna försökte lösa.

Beskriv de tankar som skrevs på tavlan under introduktionen med avseende på autonomi och heteronomi.
Viktigt att tänka på
Heteronomi och autonomi är två olika sätt att tänka som innebär trygghet å ena sidan och osäkerhet och ängest å andra sidan; maktlöshet å ena sidan och kontroll över situationen å andra sidan; ovilja till kunskap å ena sidan och medvetenhet å andra sidan; att göra det enkelt för sig å ena sidan och att anstränga sig å andra sidan; att lura sig själv till lugn å ena sidan och att ta ängsten och ansvaret å andra sidan; självbedrägeri å ena sidan och klarsyn å andra sidan; utropstecken å ena sidan och frågetecken å andra sidan.

### B.2 Övning 1 Heteronomi - Autonomi

<table>
<thead>
<tr>
<th>Heteronomi</th>
<th>Autonomi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reflexmässiga tankar</td>
<td>Konkreta värden</td>
</tr>
<tr>
<td>(Dominerad av en automatisk tanke)</td>
<td>(Vem berörs och vilka är deras värderingar?)</td>
</tr>
<tr>
<td>Dogmatiska lösningar</td>
<td>Handlingsalternativ och värden</td>
</tr>
<tr>
<td>(Fixering vid en stor och viktig princip)</td>
<td>(Vad kan göras? Hur påverkas alla värderingar?)</td>
</tr>
</tbody>
</table>
Samtycke

Här följer information om den här utvärderingen. Informationen syftar till att ge dig ett underlag för beslutet om du vill delta eller inte. Om du väljer att delta så har du dock alltid rätten att när som helst avbryta undersökningen utan att detta innebär några som helst konsekvenser för dig.


Ditt deltagande i utvärderingen beräknas ta ca 60 minuter. När utvärderingen är klar kommer vi att besvara eventuella frågor om den och dess genomförande. Har du några ytterligare frågor om denna undersökning så kan du kontakta:

Linn Löfquist, e-post: linn.lofquist.4591@student.uu.se

Var vänlig och skriv under nedan om du förstår dina rättigheter och väljer att delta i undersökningen

Även om vi har bett om din medverkan är den helt frivillig. All information om ditt deltagande kommer att behandlas konfidentiellt och inga resultat kommer att kunna förknippas med ditt namn.

______________________________
Ort och datum

______________________________
Namnteckning

______________________________
Namnförtydligande
Samtycke

Här följer information om den här utvärderingen. Informationen syftar till att ge dig ett underlag för beslutet om du vill delta eller inte. Om du väljer att delta så har du dock alltid rätten att när som helst avbryta undersökningen utan att detta innebär några som helst konsekvenser för dig.


Ditt deltagande i utvärderingen beräknas ta ca 60 minuter. När utvärderingen är klar kommer vi att besvara eventuella frågor om den och dess genomförande. Har du några ytterligare frågor om denna undersökning så kan du kontakta:

Linn Löfquist, e-post: linn.lofquist.4591@student.uu.se

Var vänlig och skriv under nedan om du förstår dina rättigheter och väljer att delta i undersökningen

Även om vi har bett om din medverkan är den helt frivillig. All information om ditt deltagande kommer att behandlas konfidentiellt och inga resultat kommer att kunna förknippas med ditt namn.

_______________________________
Ort och datum

_______________________________
Namnteckning

_______________________________
Namnförtydligande

D Consent form version 2 - with the application

61