FACTORS INFLUENCING THE CHOICE OF A CAREER IN SOFTWARE TESTING AMONG NORWEGIAN STUDENTS

Anca Deak, Tor Stålhane, Daniela Cruzes
Norwegian University of Science and Technology
Trondheim, Norway
deak@idi.ntnu.no, stalhane@idi.ntnu.no, dcruzes@idi.ntnu.no

ABSTRACT
There is an identified need of software testers in the industry with the required number of testers being expected to increase, yet the future candidates looking for positions in software industry tend to lean towards software development coding rather than software testing. In the same time, there is a gap between the education and industry needs with graduating students not being fully prepared or having the required skills when entering the testing industry. In addition to these factors, we noticed a reluctance towards this professional choice among students. In this paper we look into the elements influencing the students when making a career choice in the direction of software testing.

KEY WORDS
Software testing, testers, career, education.

1. Introduction
The continuing growing complexity of IT delivered systems triggers a stronger request for professionals and highly performing software testers. However, at the same time the industry is impacted by the lack of skills and insufficient formal education of the young graduates who enter the software engineering working field. The gap between software education and the industry needs was identified and reinforced in a series of worldwide conducted studies in Australia [1], South Africa [2], Hong Kong [4], Canada [3] and more recent Finland [6], UK [8] and Spain [7]. The lack of professional expertise is considered to be the most dominant factor in impeding the introduction and the adoption of systematic testing activities in software development companies.

A testing services survey conducted on more than 400 European organizations in 2011 [10], found an increased focus on quality assurance combined with a desire of the participant organizations to drive validation to the front of the software development life cycle. One of the main challenges expressed by this study is the view of quality assurance as an additional cost and an activity which increases the development life cycle of the application development process. In addition, there are the barriers imposed by the top management which sees testing units as "cost centres" rather than "service centres". At the same time, the desired industry profiles for software professionals are not always concise, with industry openings for tester positions asking for different or various sets of skills [5], [11]. This ambiguity in the definition of the companies about the responsibilities of testing positions, suggests a wide view of thoughts and perceptions surrounding the software tester role. The importance of establishing clear roles in software engineering was recognized from the beginnings of software development and reinforced in several studies among which we can mention Acuna and Juristo [14] and Zhu [17]. Although there is a general awareness for the necessity of improved quality of software testing, there is low level of test maturity in most software development organizations [12].

Fernández-Sanz et. al [16] published the results of a survey looking at the human factors which have a negative influence on real practice of software testing in software companies in Spain. The factors related to instability of testers positions (48 %), lack of attractiveness of testing (48 %) and poor career development for testers (41,7 %) were mentioned by less than half of the participants. Even so, the study advises us to seriously take into consideration these factors due to the high percentage of respondents. The human and social aspects of working in testing inside a testing team, as well as the attitude towards the testing team in a company, were studied from the testers’ perspective in Shah and Harrold case study [13].

The definitions of software testing and the responsibilities of a software tester seem to be unclear also among students. Analysis of the current practice in the US Academia conducted by Astigarraga [5] and Lethbridge [9] emphasises a need for improvement of the current curriculum and of focus on software testing.

The Department of Computer Science (IDI) at the Norwegian University of Science and Technology (NTNU), conducted an internal survey among its master alumni in 2007 and 2011, with the scope to retrieve the educational topics relevant to their field of expertise based on the work experience accumulated after graduation. In both surveys, Testing and QA were rated among top eight relevant topics from around 63 proposed ones. The lack of
knowledge and necessary skills can become an additional expense for the companies which find themselves in the need of providing additional education for the young testers [11].

In this paper we describe the result of a study on the evaluation of the interest and desire to work in software testing among engineering and computer science students from Norwegian University of Science and Technology, and a survey of the factors motivating and de-motivating the students in engaging in a software testing career. Our goal is to investigate in which stage of the student studies, is the opinion on a software testing career formed, the evolution of this opinion during the study years and the impact of dedicated testing courseware towards a software testing career.

The rest of the paper is organized as follows. Section 2 reviews related work on software testing in industry and education, Section 3 presents the research questions and the survey design. Section 4 describes the data collection process and the results, while Section 5 discusses the result of the survey. Section 6 closes the paper with a discussion of the ongoing efforts to promote and improve the image of a software testing career as well as software testing activities.

2. Related work

A testing services survey conducted on more than 400 European organizations in 2011 [10] presents the results of a comprehensive application testing survey conducted across Europe, and focused on understanding the internal set-up and organization of QA and testing teams. Among the results presented in the report is the fact that one in five organizations has a decentralized and ad hoc approach to application testing. The most predominant challenges in the European companies in the domain of process, tools and methodology are: the slow speed of testing combined with a lack of test case automation, limited information sharing across projects, as well as access to real-time metrics regarding the quality of the system under testing. Among resource and expertise setbacks many organizations highlighted the deficit of knowledge transfer to the testing team, lack of early sight of user requirements by testers, and a general lack of collaboration combined with insufficient domain knowledge to understand user requirements and business risks. Quality Assurance has received a stigma of additional cost and an activity that increases the development time cycle with further impediments imposed by the top management that sees testing units as "cost centres" rather than "service centres". Currently, one popular solution is to use third-party providers for testing activities. According to the authors of the report, while this approach can provide momentarily cost reduction and an increase in software quality, it does not have a positive effect in planning of the requirements and knowledge sharing. The authors also conclude that the trend of using 3rd party units for testers can stimulate the need for professional testers on the market.

The study performed by Astigarraga et al. [5] combines a presentation of testing as an industry profession, a survey of the software testing curriculum in United States and a discussion on the efforts made with the scope of increasing the status of testing in the academic curriculum. The study also highlights the low number of Software Testing journals and societies in comparison with other areas of software engineering. These results show a minimal content for the field of software testing in the undergraduate students, the topic being generally included in software engineering or programming courses. We noticed the same trend in our early educational programs. Astigarraga et al. make an interesting observation by pointing out that "software testing work is often not seen as glamorous or intellectually stimulating to the average Ph.D.-level researcher who might rather pursue novel development-oriented challenges instead". This lack of glamour of software testing in comparison with software development is extended beyond the research area towards the industry as well. The study advises on changes to the curriculum which will lead to more focus on software testing courseware and opportunities to obtain and improve education for software test engineering.

The attitude towards testing inside a software company was studied from testers’ perspective by Shah and Harrold case study [13]. The study reveals a difference in perspective between senior and junior testers. A tester was considered a junior tester, if he or she had less than two years of experience. The senior testers considered testing to be an important but boring activity. However, when mentoring the younger members of the team they chose not to share their view, and rather emphasise the advantages of being involved in testing such as: gaining a good quick understanding of the product and learn what good practice development is. In addition, the study describes the efforts made by a senior manager from the Quality Assurance team, who was aware of the testers being considered as “second-class citizens”, to raise awareness about the importance of the testing activities, to include testing team in the communication loop with the customer and to assure the recognition of the testing effort from the customers at the end of the development cycle. One down side of a being a tester proved to be the monotonous nature of the testing activities, especially for those working with manual testing. This factor was cited by the vast majority of the study participants as the main reason for not being interested in staying in the testing department, and preferring to move to other positions like development or business analyst. An important agent in keeping the testers motivated about the testing activities was the feeling of responsibility with power. By giving individual testers ownership and responsibility of testing modules, the testers felt more enthusiastic about their activities.

Although there is extensive research on motivation for software engineers [18], as per our knowledge, no empirical research was done so far with the scope of retrieving the motivation behind the attitude towards
software testing. There is little research on why people chose to become software testers. Our research is focusing on the motivation of choosing Software Testing as a profession.

3. Research questions and survey design

In order for us to raise awareness and improve the testing image in academia we need to retrieve and explore the factors that leads people to this position in the first place. We created a short questionnaire, which could be filled in less than 20 minutes in order to encourage students to participate. The research questions which determined the design of this survey are:

**RQ1:** What is the image of software testing among computer science students?

**RQ2:** What motivates and de-motivates students to choose a career path in software testing?

The questionnaire included 4 questions (See Appendix A). Besides demographical information, we were also interested in the level of professional experience in testing among the students in order to see if they had any exposure to testing outside the one provided by the curriculum. In this paper we focus on analysing two main questions that will help us to answer our research questions:

The first question enquires if students are interested in working as a tester after graduation and also we asked them to explain their answer. By explaining their answers we expect that they will also provide us with their perception regarding testing activities. In case of a negative answer the respondent will provide the de-motivating factors of a tester career while in case of a positive answer we will be able to gather the positive aspects of testing:

**Q1:** Are you interested in working as a tester in a software development company after graduation? Please explain why.

The second question is designed to determine the factors which can influence a change in the attitude towards testing and will help improve the motivation towards choosing the profession. Also, this question will allow us to perceive further motivation and de-motivation factors towards software testing:

**Q2:** What will motivate you to get engaged in professional software testing?

4. Data collection and results

4.1 Data collection

The study was conducted on a population formed by bachelor and master level students from Norwegian University of Science and Technology (groups S1 and S2), together with computer engineering students from University College (group S3). The survey was conducted towards the semester end in order for us to be able to assess the impact of the curriculum on students’ perception. A total of 161 participants responded to our survey (as shown in Table 1), representing 100% of the number of approached students.

Group S1 represents 2nd or 3rd year students attending a Software Engineering course, they are required to have taken courses Object-Oriented Programming and Algorithms and Data Structures prior attending this course. At the end of this course students are expected to be able to specify, design, implement and test software systems of sizes that require team work and co-operation. The second group (S2) represents master level students, from 3rd or 4th year, attending a Requirements and Testing focused course. Students taking this course are expected to have passed the course taken by students from S1 group. During this course the students learn techniques for testing IT systems and the relations between testing and other activities in the systems development process while keeping focus on requirements specification.

A third group of respondents were recruited from another education institution, namely Sør-Trøndelag University College (HiST), more specifically 3rd year students from their program in Computer Engineering. These students receive training in computer programming but they do not have any specific dedicated lectures or courses for software testing in their curriculum, although it is expected to receive knowledge in testing from their programming classes. For this reason we decided to add an additional question in their survey regarding the sources they are using for obtaining information on software testing (See Table 2). Half of the participants indicated the curriculum as being their main source of information about software testing followed closely by books and internet. Some participants proved to be very enthusiastic about guest lecturers presented by local representatives of software developing companies.

<table>
<thead>
<tr>
<th>Sources</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curriculum</td>
<td>12(52.17%)</td>
<td>5(21.74%)</td>
<td>5(21.74%)</td>
</tr>
<tr>
<td>Books</td>
<td>5(21.74%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internet</td>
<td>5(21.74%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guest lectures</td>
<td>3(13.04%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 1 Classification of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sources</td>
</tr>
<tr>
<td>Profile</td>
</tr>
<tr>
<td>Student seniority</td>
</tr>
<tr>
<td>Number of students</td>
</tr>
<tr>
<td>Teaching on testing</td>
</tr>
</tbody>
</table>
All the participants were asked if they have experience in professional testing. The purpose of this question is to determine the exposure level of the participant to professional software testing activities and to determine the impact of industrial experience on forming an opinion about software testing. From the 161 participants to our survey only 21 students (14 from group S1 and 7 from group S2) had previous testing experience such as part time job in software companies performing testing activities. No student from group S3 had previous experience in professional testing.

4.2 Results

Our research was performed using a combination of qualitative and quantitative methods where each method supported the other. The collected data was analyzed by organizing it from several perspectives, with our main criteria being the motivational and de-motivational factors for each participant group. The open-ended questions were coded and analyzed using the qualitative data presentation and analysis methods. For the qualitative analysis, in order to avoid researcher bias, the generated categories were reviewed and discussed in meetings between three researchers. Portions of the data was re-analyzed and recoded until an agreement was reached.

Table 3 and Figure 1 presents the results for our first question: Are you interested in working as a tester in a software development company after graduation? A vast majority of the students belonging to groups S1 and S2, is not interested in pursuing a career in testing industry while in S2 group we noticed a balance between the students who are interested (17 students) and those who are not interested (18 students) to work in testing industry.

Table 3

<table>
<thead>
<tr>
<th>Interest in pursuing a testing career</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>61(62.24%)</td>
<td>18(45%)</td>
<td>14(60.87%)</td>
<td>93</td>
</tr>
<tr>
<td>Undecided</td>
<td>20(20.41%)</td>
<td>5(12.5%)</td>
<td>2(8.7%)</td>
<td>27</td>
</tr>
<tr>
<td>Yes</td>
<td>17(17.35%)</td>
<td>17(42.5%)</td>
<td>7(30.43%)</td>
<td>41</td>
</tr>
<tr>
<td>Total</td>
<td>98</td>
<td>40</td>
<td>23</td>
<td>161</td>
</tr>
</tbody>
</table>

Figure 1

Interest in pursuing a testing career grouped per source

A numerical comparison between negative and positive factors for pursuing a testing career (Table 5) highlights a dominance of negative ones in sources S1 and S2 while in S2 both negative and positive factors are equally present.

We asked the participants to provide arguments for their answer which enabled us to retrieve positive and negatives factors influencing the students in their career choice (Table 4). In addition we created separate groups for people who were undecided about their choice or who express interest in testing under certain conditions. This group represented 23.6% from the total participants, from which 17 required more information in order to be able to reach a decision and with another 17 of the participants being interested to work in testing as long as the testing responsibilities were part of an variation of tasks and not the sole responsibility of the job. The type of software to be tested was a condition mentioned by 4 participants from S1 with game design mentioned as a favourite.

4.2.1 Negative aspects of working in software testing

From the negative factors associated with working in software testing the element of boredom stand out in all the three categories of participants. In the Boring category we included all references to boredom, boring, monotonous, not exciting, one sided job and repetitive. Table 6 and Figure 2 are illustrating the most frequent negative factors associated with the work responsibilities of a tester. We decided to leave out factors which were quoted less than eight times over all sources.

Table 4

<table>
<thead>
<tr>
<th>Reasons for indecision about working in testing</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional information</td>
<td>13(13.27%)</td>
<td>4(10%)</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Not just testing</td>
<td>8(8.16%)</td>
<td>5(12.5%)</td>
<td>4(17.39%)</td>
<td>17</td>
</tr>
<tr>
<td>Depending on software</td>
<td>4(4.08%)</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 5

<table>
<thead>
<tr>
<th>Numerical comparison between negative and positive factors for pursuing a testing career</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negatives factors</td>
<td>135</td>
<td>36</td>
<td>40</td>
</tr>
<tr>
<td>Positives factors</td>
<td>42</td>
<td>36</td>
<td>14</td>
</tr>
</tbody>
</table>

Table 6

<table>
<thead>
<tr>
<th>Negative aspects in pursuing a testing career</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boring</td>
<td>35(35.71%)</td>
<td>3(7.5%)</td>
<td>10(43.68%)</td>
</tr>
<tr>
<td>Rather writing code</td>
<td>13(13.28%)</td>
<td>9(22.5%)</td>
<td>9(39.13%)</td>
</tr>
<tr>
<td>Not creative</td>
<td>12(12.24%)</td>
<td>-</td>
<td>3(13.04%)</td>
</tr>
<tr>
<td>Status</td>
<td>6(6.12%)</td>
<td>3(7.5%)</td>
<td>1(4.35%)</td>
</tr>
<tr>
<td>Unrewarding</td>
<td>6(6.12%)</td>
<td>1(2.5%)</td>
<td>1(4.35%)</td>
</tr>
</tbody>
</table>
For the first group S1, see Figure 3, which is representing the young students we observe that almost half of them (48.61%) considers testing work to be of a boring nature. Around fifth of the participants (18.06%) are more interested in core developing as we can see from the Rather writing code category, factor which is followed closely by the lack for creativity presented in Not creative category associated with testing position (16.67%). Status and Unrewarding aspects of a tester's responsibilities are also quoted, each by 8.33% of S1 participants. One participant argument his lack of interest by the fact "testing can often have little impact on the finished product" (student, group S2) This opinion was corroborated by a series of statements from other students which were in concordance with the preconception of testers being seen as second hand citizen in the software development world: "does not seem interesting to not be able to influence the development" (student, group S1) and "test is completely at the bottom of the ranking" (student, group S1). Another uninspiring aspect from aggregated under the Unrewarding was the assumption that a software tester will be paid on a lower scale than a software developer. The financial aspect was raised again in the section of motivational factors.

For the second group S2, the majority of the group S2 (56.25%) was more interested in writing their own code (Rather writing code), aspect which they found incompatible with the testing job responsibilities, combined with concerns of not being able to gain a position as a developer once they join the working market as testers "Becoming tester tends to be less likely to become core department" (student, group S2). The lack of creativity was not mentioned by the participants from the second group, while the issue of the Status was mentioned by three students "it looks like the testers work at the end of the project with limited time and get blamed for every defect they fail to find" (student, group S2) followed by the Unrewarding category.

In comparison with the previous groups, in S3 there is no clear dominating negative factor with the two main ones coming in at a similar level: Boring (41.67%) and Rather writing code (37.5%). One participant mentioned the responsibility for the software which comes with testing as a deterring factor for him "Testing means a lot of responsibility, if something does not work after testing, it is your responsibility" (student, group S3). The issue of No creativity was also mentioned by 13.04% of the group. One student mentioned Status and Unrewarding as negative aspects of software testing. "I like to write it on my own. Others' code doesn't give you credit and thankfulness." (student, group S3)

4.2.2 Positive aspects of working in software testing

In comparison with the group negative factors which were present in all sources, the group of positive factors (see Table 7) were not homogeneously distributed as seen from Figures 4 and 5 which show the results for the positive aspects of working in testing according to the three groups.

The Interesting category includes all the statements which mentions software testing as an interesting occupation. We included under the Importance category all the statements which provided an acknowledgement of the importance of testing including the "Improving a system", while under the Experience category we aggregated the references of gaining experience and/or knowledge during testing "It would be interesting and instructive to work with other people's code and think about it in a non-traditional way" (student, group S1), "such an experience helps make me a better developer" (student, group S3). We noticed that a high percentage of the participants acknowledges the importance of testing, specially group S2 (20%), the participants of the Testing Course.

Four of the participants consider working with popular methodologies such as Test-driven development, (under Interest in TDD category), an alluring factor for the software testers. "It is another way to think about how to develop a software when you use TDD" (student, group S3).
Although they are not qualifying over the threshold of minimum four citations, we found two factors which were cited both negative and positive. First is referring to testing as not being hard coding, which proved in some cases a deficit for people interested in core development while for others it was considered a nice alternative for those who are not fond of just coding. The second factor was related to having fixed routines, which was associated with testing responsibilities while for few of participants a fixed routine was a positive trait for a work position.

### 4.2.3 Motivational factors for working in software testing

In order for us to understand the motivational and de-motivational factors towards a software testing career we asked the participants what will motivate them to get engaged in professional software testing. By retrieving the factors which can trigger a change in the attitude towards testing we can improve the motivation among the students towards choosing the software testing profession. Also, this question allows us to perceive further motivation and de-motivation factors towards software testing.

In the result of second question (see Table 8 and Figure 6), sources S1 and S3 consider they need more information on software testing in order to construct an image and provide an opinion about the possible improvements in software testing. All these statements were collocated under **More Information** category, "Lecture on testing / real life view of the workplace" (student, group S1), "Get a bit more about what the testing entails. Certainly been demonstrated in practice by some who work with it" (student, group S3). The fact that only one person from S2 had provided this answer is in line with our expectation, since the image of testing should be formed after attending a course about software testing. Group S1 considers important to have a **variety of tasks** while doing testing activities which, in their opinion will also make the testing responsibilities more interesting "If you get a variety of test tasks and feel that you participate in developing a product" (student, group S1).

For group S3, the second motivator is the financial aspect of the position (**Money**), with 30% of the students assuming that a tester will automatically have a lower pay than a developer. For group S1 also, the financial aspect is considered as important, with 10 students invoking it. "Higher salaries for testers. That testing is more appreciated. The testers will be included in other parts of the process as well" (student, group S1), "Decent pay, being involved in developing the software I am testing" (student, group S3).

The issue of the **Status** was also mentioned by students from all three groups. Several students from groups S1 and S2 requested a better marketing for the testers’ position and reputation as well as an increase on the emphasis of **Testing importance**: "increase reputation, normal SW developers look down on testers. Include testers better in agile groups, most companies have testing still separate from developers which use Scrum/X" (student, group S3). "More emphasis on testing feedback and not only finding out if something works as it should" (student, group S1).

**Get testing experience** category was dominant among students from group S2, while the second place for the same group was taken by **Improved testing methods** category which contains the reference about innovative or new testing methods such as TDD as well as an involvement in testing automation.

<table>
<thead>
<tr>
<th>Table 8</th>
<th>Motivational factors for pursuing a testing career</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
</tr>
</thead>
<tbody>
<tr>
<td>More information</td>
<td>18(18.37%)</td>
<td>1(2.5%)</td>
<td>7(30.43%)</td>
<td></td>
</tr>
<tr>
<td>Variety of tasks</td>
<td>16(16.33%)</td>
<td>1(2.5%)</td>
<td>2(8.70%)</td>
<td></td>
</tr>
<tr>
<td>Money</td>
<td>10(10.20%)</td>
<td>1(2.5%)</td>
<td>7(30.43%)</td>
<td></td>
</tr>
<tr>
<td>Status</td>
<td>8(8.16%)</td>
<td>2(5%)</td>
<td>3(13.04%)</td>
<td></td>
</tr>
<tr>
<td>Get testing experience</td>
<td>2(2.04%)</td>
<td>10(25%)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Improved testing methods</td>
<td>4(4.08%)</td>
<td>6(15%)</td>
<td>1(4.35%)</td>
<td></td>
</tr>
<tr>
<td>Testing Importance</td>
<td>4(4.08%)</td>
<td>1(2.5%)</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
5. Interpretation of the results and discussion

Most participants from groups S1 and S3 were not interested in pursuing a career in testing. Students from group S1 were very enthusiastic and opinionated in their answers and portrayal of software testing and provided the most diverse set of negative factors associated with a testing career. On the second question of the survey, the S1 group, despite having the largest number of participants provided the lowest number of request for more information on software testing, which leads us to believe that there is a certain level of overconfidence associated with a mix of young age and lack of experience.

The number of citation between negative and positive factors for pursuing a testing career was compared between the three sources and a dominance of the negative ones in sources S1 and S2 was observed. As for the S2 group, the negative and positive factors were equally represented. The group S2 was more uniform on the answers to the questions. This difference in result can be attributed to the difference in the level of knowledge about software testing, where is it safe to assume that S2 is excelling in comparison with the other groups. It is encouraging to see the positive effects of a dedicated testing courseware and it is a stimulus for further research in this area.

The S3 group, although manifested a strong desire not to pursue a testing career, was more soft spoken in their arguments and had the highest percentage of students asking for more information for Q2 question.

From the participants that responded with undecided at Q1, 17 stated they require more information on software testing in order to decide to pursue a testing career. This number, although representing a small fraction from the total participants combined with high number of participants necessitating for more information on testing for Q2, is an indication of a strong need for a change and restructure in the teaching methods applied in testing.

6. Conclusion

The study shows a lack of interest and a tendency to associate testing activities with boredom for the students not attending a software testing courseware. Around half of the students who attended the testing course were interested in pursuing a testing career and their main request was for practical experience, combined with presentation on more innovative methods and tools for testing. These result indicate the possibility of improving the perception of a testing career by changing the curriculum and reviewing some of the curriculum parts with testing professionals with the scope to retrieve the educational topics relevant to testing field of expertise. In parallel with these activities, we can discuss the dedicated testing courses with students upon course completion, and capture the topics they did not consider interesting or relevant together the ones they liked most.

All three groups that we surveyed, seem to equal testing activities with not writing code, or checking others’ code which indicates a misunderstanding of the responsibilities of testers. We need to redefine and enhance the definition of testing and combat the prejudices which are surrounding the tester role such as: no creativity, no coding, unrewarding and low status. We need to increase the focus on testing tasks and responsibilities which combine classical development roles such as: creating and writing testing automation tools. By organizing guest lectures with software professionals having strong testing careers and pointing out the writings, even the blogs of recognized professional testers such as Cem Kaner, Michael Bolton and James Bach we can improve the low status associated with testing activities.

There is a gap between the industry needs and the education the students are receiving and we should strive to decrease this gap but at the same time we should be aware of the differences between the academia and industry, and accept that it will be nearly impossible to definitively close the gap. Universities should strive to provide the best education in accordance with the latest technologies and updates from science, but the core of the education will be principles and theory.

Obtaining an university degree will take four to five years, if not more, and if the tools and methods that are taught, are not even the latest in the software industry, by the time of graduation these methods will be even more outdated. In Norway, the students studying at a university college can obtain their qualification in three years so they are more equipped with the right knowledge, which makes them more desirable for the companies.

An additional way of improving the curriculum, which is applied at our university, is the survey performed among university alumni in which they are asked to rate the relevance of the topics learned in the university. The reports based on this survey can help in improving the curriculum by retrieving the educational topics which

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proved to be of high importance and reducing the curriculum for certain courseware.

The availability of a large number of free software tools worldwide and the fast pace with which these tools are adopted, changed, upgraded and even dropped makes it difficult or even futile for a university program to establish a curriculum for these tools and implement it. Due to the long process of implementing a change in the academia we risk providing outdated material. One plausible solution in regard to testing tools will be to provide testing tool oriented topics in the last year of university to get hands-on experience so valued in industry. Our future work will focus on deciding and implementing changes in curriculum while taking into consideration the motivators and de-motivators of students, as well as presenting practices from the real world.

References


Appendix A

Software testing survey questions

1. Are you interested in working as a tester in a software development company after graduation? Please explain why:
2. What will motivate you to get engaged in professional software testing?
3. Do you have professional testing experience?
4. What were the sources you used for obtaining information on software testing?