Information Literacy and Critical Thinking  
Freshman Course Experience  

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Abstract - The aim of the research is to prove author’s intention of designing a successful high school freshmen course that can improve students’ generic skills and competences needed to empower them on a journey to become valuable contributors of modern society. Literature review of similar successful courses was used for general course design technique with some learning outcomes modified from information literacy and critical thinking international standards. All main design principles of “Information literacy and Critical thinking” course syllabus is elaborated. Discussion part concerning students’ satisfaction and skills improvement is followed after the analysis of two types of surveys conducted over the first two generations of students. 

This particular course is very rare, if not unique, as an approach for freshmen generic skills improvement in Croatian High Education society. This elaborated experience is excellent opportunity to provoke wider society discussion in order to establish formal ways to improve employability skills of Croatian students.  

Keywords - information literacy, critical thinking, generic skills, fake news, freshman course  

I. INTRODUCTION  

Global phenomena of industry shift to “Industry 4.0”, or business in the digital age 1, is one of leading topics on World Economic Forum agenda, today’s world leading International Forum for Public-Private Cooperation. “Concurrent to the technological revolution are a set of broader socio-economic, geopolitical and demographic drivers of change, each interacting in multiple directions and intensifying one another. As entire industries adjust, most occupations are undergoing a fundamental transformation. While some jobs are threatened by redundancy and others grow rapidly, existing jobs are also going through a change in the skill sets required to do them” [1]. Parallel and fully related to cited report from series Future of Jobs, even more important dialog on education started. 

In 2015, WEF published a report that focused on the widening skills gap and ways to address it through emerging and ubiquitous technology [2]. In that report, a set of 16 crucial proficiencies for education in the 21st century is laid out. Those skills include six ‘foundational literacies’, and ten skills that are labelled either as ‘competencies’ or ‘as character qualities’.  

Figure 1. 21st Century skills [2]  

In about same time another global phenomenon aroused — fake news. Although it dates back to 1938, when the broadcast of a radio adaptation of H. G. Well’s drama “The War of the Worlds” frightened an estimated one million residents [3]. It was present in modern society as a way to amuse by mocking the established order, on daily bases by John Stewart, host of Comedy Central “The Daily show” and The Onion News Network, a satirical daily web video broadcast that had been in production since mid-2006. All that changed with the 2016 USA presidential election and its aftermath. Fake news, once delivered by cable channel hosts and comedy writers, became more ominous as the electorate slowly realized how altered facts had been created and manipulated to influence a nomination and election. A recent study by the Pew Research Center found that only 11% of those surveyed were not confused by current events news stories, with the vast majority experiencing some or a great deal of difficulty discerning a story’s legitimacy [4].  

II. COURSE  

In about the same time the author offered full freshmen course named “Information literacy and Critical thinking” developed for the students of IT design, an orientation of Undergraduate study of Information Technology at Zagreb University of Applied Sciences. The general idea was to empower new students to better develop skills and competences needed for new learning environment –

1 Industry 4.0 | World Economic Forum, May 12, 2016, https://www.weforum.org/agenda/2016/05/industry-4-0/ (accessed on 4.2.2019)
university study. Two basic topics of Information literacy and Critical thinking are used as front skills that should be both understood and practiced during the course, followed by myriad of valuable skills and character qualities introduced, developed or enhanced through the course.

A. Previous experience

Looking for similar courses through literature research and worldwide practice showed mixed results. Not much course examples were found, especially ones having both topics connected. It seems like Information literacy, mainly advocated by Librarian communities through its models and standards seems very loosely connected with topics of Critical thinking. Similar situation is in Croatia, where only one documented example of such courses was found. As expected, topics is on Information literacy, and the course is conducted at School of Medicine, University of Zagreb. Together with Central Medical Library, they are delivering compulsory course “Introduction to Research in Medicine” since 2011 [5].

However, American Association of School Librarians (AASL), in the release in 2007 of the “Standards for the 21st Century Learner”, provided a very effective description how Information literacy is intrinsically connected to critical thinking. Standard identifies following four classes of skills: (1) Inquire, think critically, and gain knowledge, (2) Draw conclusions, make informed decisions, apply knowledge to new situations, and create new knowledge, (3) Share knowledge and participate ethically and productively as members of our democratic society and (4) Pursue personal and aesthetic growth [6]. This popular AASL standard is for instance fully incorporated into USA nonprofit organization Partnership for 21st Century Learning (P21) initiatives, which together with its members and partners have been pioneers of 21st century learning since 2002.

So, the skills to develop indicators from the first group of strategic skills “Inquire, think critically, and gain knowledge”, de facto became learning outcomes for the Course:

| 1. Follow an inquiry-based process in seeking knowledge in curricular subjects, and make the real-world connection for using this process in own life. |
| 2. Use prior and background knowledge as context for new learning. |
| 3. Develop and refine a range of questions to frame the search for new understanding. |
| 4. Find, evaluate, and select appropriate sources to answer questions. |
| 5. Evaluate information found in selected sources on the basis of accuracy, validity, appropriateness for needs, importance, and social and cultural context. |
| 6. Read, view, and listen for information presented in any format (e.g., textual, visual, media, digital) in order to make inferences and gather meaning. |
| 7. Make sense of information gathered from diverse sources by identifying misconceptions, main and supporting ideas, conflicting information, and point of view or bias. |
| 8. Demonstrate mastery of technology tools for accessing information and pursuing inquiry. |
| 9. Collaborate with others to broaden and deepen understanding. |

The further search for examples of Information literacy and Critical thinking skills courses also gave poor results mostly because of the fact that in most developed countries such learning outcomes are incorporated in learning outcomes of a whole study, not just a single class.

For instance, each of the University of Kansas Core’s six educational goals has one or more distinct learning outcomes, which can be met by a variety of courses and educational experiences2. For example, they defined Goal 1 as “Integrate information literacy, research skills and information resources into the curriculum to enhance critical thinking, academic success and lifelong learning”. This goal has two specific learning outcomes, with related metrics. On a list of University of Kansas Critical Thinking and Quantitative Literacy approved courses, there are 204 courses within Goal 1 and learning outcomes 1 or 2, student can pick in order to gain desirable skill.

In 2016, in project Polytechnics 2025, Zagreb University of Applied Sciences designed its own educational standards and started the harmonization of study programs in order to meet the needs of existing and future Croatian labor market. Project team developed 13 new occupational standards proposals, improvement proposals for nine existing study programs and made four completely new study programs. In order to develop all study programs, a complex and detailed model with competences as a pivotal entity was deployed. Usual entities from education point of view like Education institution, Department, Study, Study program, Course, Learning Outcomes, etc. are related to employers’ side entities like Occupation, Working place, Key job, etc. Down through the Skills and Competences, which are the central entities enabling mutual understanding of student’s wishes and employer’s needs [7].

Unfortunately, existing study programs, like Undergraduate study of Information Technology, did not have a chance to re-model current study programs accordingly. That is the main reason for decision to build one Course from the scratch.

Advanced search for best practice found few usable examples of elective, student orientation courses like ones in San Diego State University [8], or as block of two “thought and expression” courses “Advancing critical thinking and information literacy skills in first year college students” delivered at Gonzaga University, Spokane, WA [9].

B. Course Design

As Zagreb University of Applied Sciences is known of very practical approach, much more emphasis should be on delivery part than on theoretical knowledge. That is why the Course have only one knowledge test, delivered in early stage, right after explaining the theory through main principles.

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2 The University of Kansas, KU Core, General Education Goal 1, http://kucore.ku.edu/goal1 (accessed on 4.2.2019)
In order to get the knowledge, students should gain experience through practical work, applying Dale’s Cone of Experience\(^3\).

A delivery should be both in on stage presentation (developing rhetorical and visual skills) and in a form of a seminar, teaching them to stand up for their idea and be able to elaborate it in more than one form. Delivery should involve teamwork and foster open and constructive communication, which are top two generic skills Croatian IT employers are looking for [11].

All the teaching and exercises should be done in front of the all class, letting them to learn not primary from lecturer, but much more from each other, either through good or bad examples. Moreover, it should foster changing mind philosophy, encouraging and valuating intention more than a result [12]. Students should be free to make mistakes, learn out form them and eventually later on produce acceptable result. Atmosphere should be encouraging, not strict with only one truth.

An ERR teaching method should be used whenever possible. ERR stands for Evocation (E), Realization of meaning (R) and Reflection (R), and is adopted from both Reading, Writing, and Critical Thinking for the 21st Century [13] and Croatian Reading and Writing for Critical Thinking Project teaching materials [14].

Exercises are primarily used for discussions and head start of given tasks in order to check out weather all students understood what they have to deliver. Since their task could be categorized as Group-Based/Open-Ended Problem Solving, Flipped Classroom learning method in a broader sense is used [15]. Most of their actual work should be done outside the class organized by themselves, with very rigor milestones.

Lecturer should be easy, friendly, authority based on knowledge, attitude and professionalism. Offering interesting, new or twisted facts and situations, asking questions, provoking dialogue, letting students express themselves freely. At the same time, he/she should keep the pace of three long hour sessions, continuously showing progress, often with recapitulation of learned topics. Fully active and helpful during exercises, and especially breaks, discussing good practice results or approach as much as possible. Available offline, approachable by mail and phone when needed.

\textbf{C. Course Delivery}

According to the Course design, both lectures and exercises are conducted in one large classroom, in 3-hour sessions. At the beginning of a Class, there are more lectures than exercises and later on, there are practically only preparations and exercises, delivered in teams.

First session is very important is, when introductory (set the scene) lecture about the importance of the actual fake news scene is presented, followed by the story of Trumps elections and a group of Macedonian students, who made a small fortune out of the fake news production used in his campaign [16]. After that, the whole course with exact calendar is presented up front, followed with a session on their understanding of what information literacy and critical thinking actually is. For them, in their own terms.

Several next sessions are more lecturing, followed by knowledge test of understanding the basic concepts. After that, all students are assigned to teams, each with specific role, according to the Bloom’s Six Thinking/Learning Levels [17]. Adopted roles are (1) Team leader, (2) Analyst, (3) Evaluator, (4) Synthesist, (5) Visualizer and (6) Creator. Team lead is supporting role, joker in a way, responsible for all team delivery. Analyst would gather appropriate information (mostly from the internet), and evaluator would evaluate it using CRAPP methodology developed at California State University [18]. After discussing their idea, Synthetist would make a mind map, and Visualizer would make presentation together with creator who would write a 7-10 pg. seminar. There is maximum of nine teams, so if there are more than 54 students, later role would be given to additional students.

What are the topics they are taking their stance, presenting and writing about? It is another information literacy/critical thinking exercise. They are given very generic, big themes like satisfaction, money, success, user, beauty, emotions, experience, change… etc. In first exercise, they learn how to narrow the scope. Exercise was adopted from Esther S. Grassian Teach Information Literacy & Critical Thinking site [19]. After that, they discuss and mutually agree upon their hypothesis/stance, and start working on content according to the schedule. Each week they are trained into the next role and after a week, they present each role’s progress. Therefore, within 10 weeks, they are ready for the presentation and couple of weeks later they need to deliver a paper work in a form of a seminar. Both presentations and seminars are open for discussion, from all students and lecturer, pointing out both strengths and weaknesses.

Basic literature for the course is of course in Croatian language - ”Informacijska pisanost - Teorijski okviri i polazišta” [20] and “Kritičko mišljenje - prinučnik kritičkog mišljenja, slušanja, čitanja i pisanja” [21].

\textbf{III. RESEARCH}

The aim of the research is to prove author’s intention of designing a successful high school freshmen course that can improve students’ generic skills and competences needed to empower them on a journey to become valuable contributors of a modern society.

\textbf{A. Methodology}

Literature review of similar successful courses was used for general course design technique with most of learning outcomes adopted from “Standards for the 21st Century Learner” AASL standard. Two type of surveys were conducted over the first two generations of students.

\(^3\) According to Dale’s Cone of Experience (1946) the base of the cone is characterized by more concrete experiences, such as direct experiences (real-life experiences), contrived experiences (interactive models), and dramatic participation (role plays). Direct purposeful experiences represent reality or the closest things to real, everyday life and are the best way for learners to remember. They remember 90% of what they do [10].
First is official institutional survey of student satisfaction performed for all classes and the recent one is constructed by the author looking for students’ personal improvement and their recommendation of most important skills and competences acquired during this Course.

B. Students satisfaction survey

Students satisfaction survey is official institutional survey that is performed at the beginning and at the end of each class, so all classes and lecturers can be compared. It has two group of questions: about topics of a course and about lecturer performance. At the beginning of each class 14 questions are asked - 10 about the class and four about lecturer, and at the end of each class 27 - 18 about a class and nine about lecturer. Scale is classical school grading (1 – 5). The survey is mandatory, but students can fill in the blanks, so there is usual low return rate. For this survey, return rate of first year (2016-17) was 63.04 % (29 out of 46 students) and for 2017-18 was 93.85 % (61 out of 65).

From this survey, 13 questions are used to analyze students’ satisfaction and comparison with other classes during their study – eight about the class and five about the lecturer.

**Figure 3.** Official students satisfaction survey average performance and comparison

It is obvious that for both years, students are highly satisfied with the course as well as the lecturer, and their satisfaction is much higher than the satisfaction with the whole study. During the second year, the satisfaction is even higher. It is probably because of teachers’ performance, because the content was unchanged. Questionnaire scale is standard school grading from 1 to 5, as in official one.

**Figure 4.** Selected 13 questions, comparison for two year period

All the grades are above 4 (very good), most of them inclining to excellent, which is not common for students’ grade (as seen from study average in Fig 2). It is obvious that the students received class very well, especially the way lecturer approached them – lot of interaction, open communication and discussion.

C. Students improvements survey

As students satisfaction study intention is not to go into the actual topics of each class, in order to understand their attitude towards the class, author decided to conduct much more detail questionnaire looking for their personal improvement of most important skills and competences acquired during the course.

Survey was unannounced, and conducted from 21st to 29th of January 2018, for both generations. As it is more than half year, or year and a half in other case, students were not biased by anything from the class; they were truly recollecting their thoughts about the things they have learned.

It was prepared and executed via Limesurvey survey system from Croatian University Computing Centre (SRCE). It addressed 109 students out of 111 who competed the Course (two of them left the University) and got exceptional return rate of 38.53 % answers (42 out of 109). Six of them were uncompleted, so there is more than qualified representation of almost one third of total population – 33.03 % (36 out of 109).

As in the class, majority of students were male (72.22 %), with little more (19:17) students with general (gymnasium) than vocational background. Majority of them (88.88 %) are 20 – 25 year old. Half of them (52.77 %)
skills (82.72) to be made, that in average they pointed out almost nine skills each (8.72), proving a point that most of learned skills are considered very valuable to them. A list of top 10 acquired skills, all mentioned from more than a half of students, is given in Table 2. The percentage is calculated as percentage of students nominated particular skill in an arbitrary group they believe are most valuable.

Table 2. Most valuable acquired skills according to students recommendation

<table>
<thead>
<tr>
<th>#</th>
<th>Top skills</th>
<th>%</th>
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<tbody>
<tr>
<td>1</td>
<td>Teamwork</td>
<td>75.00</td>
</tr>
<tr>
<td>2</td>
<td>Taking the stance/attitude</td>
<td>61.11</td>
</tr>
<tr>
<td>3</td>
<td>Critical evaluation of stance (own incl.)</td>
<td>61.11</td>
</tr>
<tr>
<td>4</td>
<td>Idea and formulation</td>
<td>58.33</td>
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<tr>
<td>5</td>
<td>Argumentation</td>
<td>55.56</td>
</tr>
<tr>
<td>6</td>
<td>Responsibility</td>
<td>55.56</td>
</tr>
<tr>
<td>7</td>
<td>Communication</td>
<td>55.56</td>
</tr>
<tr>
<td>8</td>
<td>Self-criticism</td>
<td>52.78</td>
</tr>
<tr>
<td>9</td>
<td>Awareness of information need</td>
<td>50.00</td>
</tr>
<tr>
<td>10</td>
<td>Persistence</td>
<td>50.00</td>
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</table>

First of all valuable skills list is Teamwork. This means that 27 students out of 36 of them selected Teamwork. Even they were not taught this skill during the class (no special teamwork instructions during the class, they were rather forced to work in teams), they all realized how important is not to work alone in order to solve given task. As this also on the top on employers list of competences [11], intention of an author of a course is fully accomplished. Apart of already mentioned basic Critical thinking and Information literacy skills (taking a stance, argumentation, and information need awareness) there is remarkable list of valuable personal skills / character qualities like responsibility, self-criticism and persistence. The other ones standing out is realizing the value of improved communication (No2 on employers list [11]), and definitely generating the idea and how to appropriate formulate it. This particular one in not high on their list of improvements (16), but after the Course they got the idea of its importance right (4).

D. Discussion
From both surveys, it is obvious that students had very positive experience with the Class. From immediate comments during official survey there were much more positive than negative comments. The only real negative
was two comments under category “Unclear purpose and benefit of the Course”, which suggests that early in the beginning of a course author should check out are all the students on the same page, realizing what is the intention of the Class. The rest of the comments (10) were very positive, encouraging, including the remark “Dynamic atmosphere, encouraging discussion and interactivity”, really describing the working atmosphere. Even if considering one student complained of “very long schedule (Thursdays, from 18:15 – 21:00)”, and one complaining, “that the workload of roles were not equally distributed, so some students made benefit of others work”. However, this was done by design to emulate situations from the real life, where some obstacles like late working hours are often necessarily, including unjust division of tasks.

Comments made during their second survey (what did they learn) are even more positive, considering the fact that only one student chose option “I did not learn anything”. Out of 33 received comments, four of them were not really connected to any Class benefit, and several of them were simple and obvious answers like (critical thinking, value of information, recognizing fake news, team work, value of communication, …); but there are more than dozen, shoving real breakthroughs in their everyday life as: “I learned how to learn. I have developed the ability to understand the learned and how to get reliable information.”, “Observe things from a different angle.”, “Good ground for further learning of certain things”, “Improved way of thinking and approaching a problem with open mind, teamwork”. Even small essay: “In a way, I got a new glimpse of the world and began to think differently, from everyday things to some more complicated ones. That is why I am judging even more before making a decision (though it sometimes happens to be a mistake). I would like to add that through the subject I have even more mentally matured and strengthened myself.” Most of them could be summarized with “I have adopted my way in a new way to think. As explained in the answer below, I have somehow made a progress in personal development”.

After this free form comments of what they have learned, they were just asked final question to choose area of their life they improved the most: faculty, family, friends, work, personal development, all of above or none. Most of them (41.66%) attributed it to the area of personal development.

IV. CONCLUSION

This Course is very rare, if not unique, as an approach for freshmen generic skills improvement in Croatian High Education society. Results and discussion of students evaluation of the Course presented in this research clearly confirms that “Information Literacy and Critical thinking” course is successful high school freshmen tool to their generic skills and competences development and improvement in order to empower them on a journey to become valuable contributors of modern society. Not only Croatian society, because the students’ list of most valuable acquired skills is very much corresponding to 21st Century Skill Set promoted by World Economic Forum.

REFERENCES

[19] Esther S. Grassian, Teach Information Literacy & Critical Thinking site!, https://sites.google.com/site/teachinfolit/, (accessed on 4.2.2019)