Advanced Information Technology Tools for Media and Information Literacy Training

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Abstract. Media and information literacy is an essential skill in the Digital Age. Indeed, the lack of knowledge and skills in media literacy is one of the reasons people are unable to analyse and evaluate information, thus creating a fertile breeding ground for unfair use of the World Wide Web. These days, people use information technologies to develop necessary insights and mindsets in order to appreciate adequately the overwhelming amount of information. Our purpose-designed Media and Information Literacy course lies at the core of freedom of expression and information. Prioritized information technologies empower learners to understand the functions of online resources, to critically assess their content, and to make decisions as users and producers of information and media content. The benefits from these technologies are obvious. They are extremely affordable, and the devices to implement them are always at hand.

This paper is in response to a call for input to a study of media and information literacy at the State University of Telecommunication (Kyiv, Ukraine). It covers the issues of applying information technologies to study media literacy. The effective implementation of the course is based on the author's unique approach, which includes the active use of a "media-creator" computer game, fact-checking methods, and special software. The media and information literacy course is regarded as a set of steps, as manifest in the paper. The obtained results demonstrate that having attended an array of classes, having learnt theory, and having fulfilled practical tasks, students become more informed, sensitive, and aware of the information they receive on the Internet.

Keywords: Information technology, Technical device, Online resource, Media literacy skills, Fact checking.

1 Introduction

Information technology has become a vital and integral part of daily life. The rapid process of informatization has saturated all spheres of our life, including education. It should be noted that new technologies include useful tools. As one would expect, they create favourable conditions for learning, since the classroom does not require special or complex equipment.

The huge amount of information that I get via the Internet makes the issue of media and information literacy relevant to our modern digital society, where the creation, distribution, use, integration, and manipulation of information is a key economic, political, and cultural activity. A large amount of information is one of the reasons leading to a superficial perception of information. In turn, this great amount results in many users' inability to distinguish true facts from manipulations and subjective judgments. According to UNESCO's international experts, the lack of knowledge and skills to analyse information make up a hidden threat to security and stability in society [1].

In February 2018, Kyiv International Institute conducted a sociological survey that captured the views of 2,043 Ukrainian residents. The survey contained certain questions on media literacy, which had the following results: About 52% of respondents did not verify the information they get from the media; however, 53% of those polled were sure that in most cases they were able to distinguish fakes from actual facts. Among the key identification credentials, respondents named media credibility and the author of the message [2].

The sociological data proves that respondents have a low level of knowledge of media literacy issues and a lack of practical, information-verifying skills.

The lack of media and information literacy creates a fertile breeding ground for unfair use of the web, including the distribution of false or manipulative content. However, the same online technologies can assist in developing the necessary skills for conscious perception and processing of online messages. Therefore, the main objective of our course is to teach students actionable ways they can verify information's accuracy, applying information technologies.

UNESCO defines media and information literacy as "a composite set of knowledge, skills, attitudes, competencies and practices that allow one to effectively access, analyse, critically evaluate, interpret, use, create and disseminate information and media products with the use of existing means and tools on a creative, legal, and ethical basis". It is an integral part of "21st century skills" or "transversal competencies" [3].

Computer-mediated communication includes social networks, blogs, online newspapers, and so on. They produce a huge number of messages whose truth or falsehood is difficult to grasp without particular skills. Therefore, knowledge and orientation skills in the information space are exceptionally urgent at the present time. Additionally, such skills are extraordinarily valuable during war time, crises, or other resonant events, since the ability to think critically reduces one's risks of being manipulated in society.

In this study, I focus on the use of technical devices, as this is the most accessible way to analyse and verify Internet information that does not require additional equipment. Portable devices are an integral part of most people's routine, as personal devices and gadgets serve to perform crucial informative and communicative functions. Moreover, modern technical devices make education and learning possible anywhere and at any time.

The skill of correctly using online resources, including understanding the structure of creating media messages, enables to take conscious advantage of modern infor-

mation and communication resources and not to become a victim of manipulation, misinformation, or social engineering. Therefore, our goal is to teach students to use information sources and means of communication responsibly and consciously, to prepare them for new conditions in their future work, to teach them to apply the capabilities of information technologies, to develop the skill of quick information analysis and verification, and to avoid manipulative people who have mastered the art of deception on the web.

2 Previous Studies

The question of the conscious use of online information has become extremely urgent in the 21st century, since manipulations and distorted facts have caused a wide range of national conflicts and confrontations. For example, according to Freedom House report, online manipulation and disinformation have been used in at least 18 countries during elections in recent years [4]. In her report, Viviane Reding, the EU Information Society and Media Commissioner, laid stress on the statement that people need a greater awareness of how to express themselves effectively, and how to interpret what others are saying, especially on blogs, via search engines, or in advertising [5].

Jesus Lau expressed a thought that information processing skills in the informative and communicative sphere increase the level of critical thinking, develop media literacy, and contribute to understanding the structure of information and communication processes in the modern world [6].

Issues related to the study of media and information literacy are viewed through the development of critical thinking (A.Dorr [7], L.Masterman, [8], R.Paul, L. Elder [9], B.Parry, J.Potter, C.Bazalgette [10], K. Tyner [11], C.Worsnop [12]); understanding the structure of the media (D. Frau-Meigs [13], D.Buckingham [14], A.Hart [15], Y.Krylova-Grek [16]); and media psychology (D.Giles [17], P.Rutledge [18], H.Asrafi-rizi, Z.Gh.Khorasgani, F.Zarmehr, J.Peña [19], L.Naydenova [20]).

At present, a variety of media literacy courses are being developed all over the world. Each of them has its own peculiarities and modifications, based on the intended age group and on the teaching methods.

For instance, Prof. Divina Frau-Meigs, one of the leaders of the movement in modern media education, has discussed the special importance of education in the information and communicative sciences. She emphasized the fact that disinformation and the lack of elementary analytical skills can become the cause of misunderstandings and conflicts. Her media literacy course MOOC DIY EMI is based on this approach, and it includes role playing to evaluate the work of the media from a professional point of view. When scrutinizing a certain media product, group members are divided into researchers, analysts, and content creators [13].

In the run up to the 2019 Ukrainian presidential election, International Research & Exchanges Board (IREX) designed a special, one-time media literacy project aimed at developing orientation skills for use with pre-election information [21]. Project «Media literacy program for citizens» was implemented with support of the Department of

Foreign Affairs, Trade and Development (DFATD Canada) together with the Acadamy of Ukrainian press, IREX and StopFake [22].

The recommendations do not include the practical use of information technologies; however, I strongly believe that the skill of checking information quickly using modern tools is an important component of media and information literacy.

The integration of technical devices into the learning process results in not only increasing its effectiveness but also made possible the implementation of alternative forms of study, such as Blended Learning, E-Learning, and Online Learning.

The study of the implementation of mobile internet devices was covered in the works of Ng. Wan, H. Nicholas, S. Loke, & T. Torabi [23-24], J. Herrington, N. Ostashewski [25], J. Traxler [26], A. K. Katrina [27], L. Kolb [28], J. Keengwe [29]. The researchers also consider the use of technical devices in online education and Blended education A. Kitchenham [30], D. Parsons [31-32], L. Chao [33].

D. Parsons thinks that utilizing available digital resources significantly enhance students' learning experiences. In his works, he showed the benefits of technological tools in contemporary classrooms. According to his point of view, the use of technical devices in blended learning leads to improved learning outcomes [31].

Talking about the positive side of Ng. Wan emphasized that ubiquitous learning is able to situate the learner in both the real and virtual world, regardless of time and place, where questions encounter. The student can immediately find the answer by accessing and conducting research on the Internet [23].

According to A. Kitchenham, mobile learning (m-learning) can take place in any environment using technologies that fit in the palm of the hand or can be easily carried from one place to another. He said about the advantages of implementing m-learning into blended learning practices [30].

As can be seen from the above, the effectiveness of using technical devices in the learning process is proven by numerous research. That is why we think that the integration of mobile internet devices will improve the effectiveness of media literacy education.

According to UNESCO's definition, "media education is associated with all types of media (print, graphic, sound, screen and other formats) and various technologies. It helps people to understand how mass communications are exploited in their societies, to master skills of using media in communication with other people", etc. [34].

Media literacy has also been popularized through online distance media literacy courses on learning platforms like Prometheus, WOMO, etc. However, such methods have a number of disadvantages associated with a volitional sphere. For example, learning a course requires stronger organizational skills and more self-discipline. Therefore, I insist on using direct contact with the audience to improve work efficiency.

3 Research Data

After analysing the existing media literacy courses, I noted that their common feature is the use of theoretical and creative tasks aimed at developing critical thinking. How-

ever, most do not consider the issues related to the use of technical devices for quick information analysis and processing for media literacy education.

The development of quick information processing skill is a primary goal in today's society, when the news feed is constantly being updated, multiply times per day. Therefore, I formulated the following hypotheses: The use of technical means increases the effectiveness of media and information literacy training, develops skills of rapid information analysis, and promotes the use of critical thinking while reading media content.

Our study is aimed at confirming the hypotheses put forward and at manifesting the role of modern information technology for the development of media and information literacy skills that can be used by students in any place and at any time.

The benefits of these technologies are obvious. They are extremely affordable, and the devices to implement them are always at hand. I distinguished technical devices according to 1) The personal Mobile Internet Devices or Internet gadgets, such as Pocket PC, and smartphones; 2) Tablet PC such as Ultra Mobile PC, Internet tablets, Web tablet [35]. I recommend these devices because the following features characterize them: usability, lightweight, a small size, a long battery life, and high resolution. These features made them convenient and ease of use, so people may find the information they need anywhere. Therefore, I use the high tech approach to learning utilizes different technology to aid students in their media literacy learning.

The training course "Media and Information Literacy" employs technical tools to develop skills for quick and rapid analyzing, processing and verification information and for the development of the skills of spotting manipulations in media content.

I applied the following methods in order to collect data: questioning, testing, interviewing, analysing results, and processing the obtained statistical data. The teaching methods include explaining, demonstrating, collaborating (discussions, group work, role-play game, practice by doing).

The classes were held on the campus of the State University of Telecommunications (Kyiv, Ukraine) in December 2018. The classes were attended by first-year students of Information Security Department and second-year students of Information Technologies Department. Their total number was 104. Students were divided into 5 groups: three groups included 20 students each, one group consisted of 21 students and one group consisted of 23 students.

The complete course included five 40-minute lessons, which was perfect for working out media and information literacy skills using students' personal technical equipment, such as smart phones, tablet PCs, and computers.

During the very first lesson, I conducted a survey to find out the students' self-assessed level of knowledge about media and information literacy. The multiple-choice questionnaire consisted of a stem and several alternative answers.

The survey showed that 59.6% of respondents were sure that they were able to distinguish between true and false information, and 24.5% believed that they were able to distinguish fake news in most cases.

Thus, 84.1% of students were sure that in most cases they were able to notice deception and manipulation contained in informational messages. And therefore, in their opinion, they were unlikely to become victims of manipulation.

Additionally, only 6.7% of the respondents were convinced that they would not recognize fake news, and 9.2% doubted that they would be able to distinguish misinformation from the truth. Thus, only 15.2% doubted their ability to distinguish between the truth and false information.

However, as further research demonstrated that 67.9% considered their intuition to be the key criterion for evaluating the truth or falsity of the message, while 23.2% of respondents completely relied on the information posted by their friends on social networks. It is noteworthy that only 5.7% of young people tried to check information in other sources, and 3.2% were not interested in news at all.

It should be noted that only 6 students (5.7%) tried to verify the veracity of messages using Internet resources. Thus, the results of the first stage proved the expediency and necessity of conducting further classes (see Fig.1).

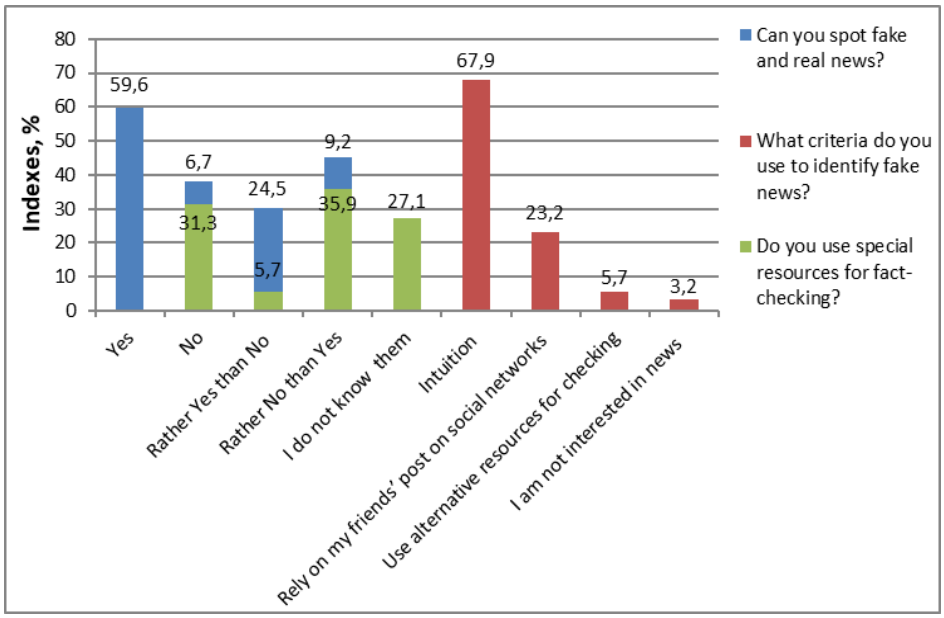

Fig. 1. The level of media literacy self-assessment before the training.

The second part of the lesson was conducted in the form of a test game "True-False". Students were offered short messages to be evaluated for truth or falsity. The results showed that only 21.2% of the students were able to give the correct answers in most cases (by most I mean more than 50% of the correct answers). 60.9% could not give the correct answers in the majority of cases, while 17.9% found it difficult to answer.

Thus, the difference between confidence in one's own media literacy and the actual situation is 62.9%. This result indicates that more than half of the students did not know how to check and analyse information messages and that they had a rather low level of media literacy (see Fig. 2).

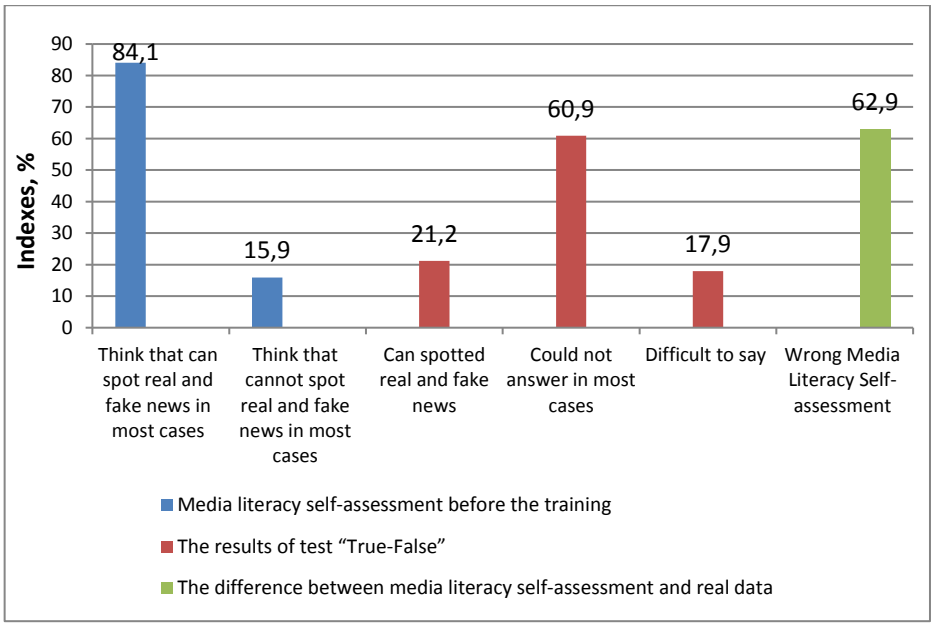

Fig. 2. The difference between students' confidence in their own media literacy level and the actual situation.

The goal of the next lesson was to introduce methods and technologies that allowed them to check information and facts for truth or falsity. To achieve this, I systematized the existing online resources, selecting the most simple and effective to use. In class, students practiced using resources to verify the information offered. One of the main recommendations was to check by using different sources, which made it possible to compare and analyse information to distinguish personal judgments from facts.

Because there are frequent cases of people using photographs that have nothing to do with the event that the photos illustrate, it is important to relay the time and place where a photo was taken along with the other information associated with the photo. The easiest way to find an image is using Google Chrome, which allows users to check whether photos or videos have been used before and under what conditions. For those using Firefox, I suggested using the "Who stole my pictures" resource [36].

The other examples of resource are the following FactCheck - resource for checking information in English [37]; VoxUkraine — independent analytical platform [38]; Foto Forensics is an online resource for determining error level analysis (ELA): modified or added details. Using the software, one can get EXIF-data as well. [39]; Findexif.com is an online resource used to check photos taken in the EXIT format, which allows getting data about when and where a photo was taken [40]; Pipl.com can be used in case one needs to check who exactly is distributing information. The given resource is especially useful for social networks. It should be noted that the software is included in the search engine of American-based social media networks, such as Facebook, LinkedIn, MySpace etc. [41].

Students also learned to understand the difference between facts and judgments. They recognized that only facts are the subject of verification, while personal judgments are often used to influence the readers's emotional and volitional spheres.

At the third stage, the students themselves created news employing the computer game called the "Manipulator" [42]. The purpose of the game is to identify the most advantageous mechanisms for creating junk and manipulative news widely used by unscrupulous journalists. In addition, while playing, the students determined which lexical and graphic tools can be used to influence our emotional sphere and the way such news can manipulate individuals' and communities' behaviour.

At the fourth stage, I offered news from the Internet to train the students' skills of verifying the truth or falsity of provided information. In this lesson, students used online resources and personal gadgets. At this stage, I put into service some ideas and concepts of the MOOC DIY EMI course (by Divina Frau-Meigs). I changed the social roles between groups to create and analyse messages.

Content creators generate context, depending on the task. Analysts read the information, check its sources, confirm or deny it, justify their conclusions, and decide whether to disseminate such information online or not.

First, the students were the authors of the news, then they had to analyse the messages written by the other groups.

Students were divided into 4 groups. Each group chose three topics from the proposed list and prepared fake or true news. It was up to students to decide which news would be created as fake and which as the truth. After the news presentation, other groups had to determine its truth or falsity. They had to argue and prove their point of view after checking and comparing the facts.

The fifth and final lesson was devoted to the author's game "Why do I need ... ?". The purpose of the game to show how different features of the item can be highlighted in negative or positive light with the aim of attracting buyers or vice versa (if you act as a competitive company). The game helps to identify the most advantageous mechanisms for creating junk and manipulative news widely used by unscrupulous journalists. In addition, while playing, the students determined which lexical and graphic tools can be used to influence our emotional sphere and the way such news can manipulate the behaviour of individuals and communities.

Students in groups created ads using data from online resources. One of the tasks was to make news about a new kind of medicine that helps people quit smoking. Students in groups 1 and 2 had to write a message that would stimulate the purchase of the medicine with the conditional brand name "smoky-nicht." Students of group 3 and 4 played the role of a rival company who needed to write a message aimed at reducing sales of this medicine.

The final questioning that was conducted to determine the level of media literacy showed that 63.4% of the respondents were able to give the correct answers. The correct answers were obtained in the majority of cases. (By the majority, I mean more than 50% of the correct answers).

After checking the hypothesis of differences between the levels of media literacy of students before and after the training, the following results were obtained: 63.4 % of students spotted fake news (it is and 42.2% more than before the training), and

79.6% of students used technical devices for fact checking (it is 73.9% more than before the training).

That hypothesis is accepted that the proportion of level of media literacy after the training is higher than it was before. Moreover, after the training the students recognized the dominant role of information technology for fact checking and used them in practice.

Thus, the obtained results demonstrate an increase in media literacy by a rate of 42.2%. Furthermore, 79.6% of the students answered that they planned to apply their new skills into practice. This result confirms our hypotheses about the effectiveness of information technology use in media literacy trainings (see Fig. 3).

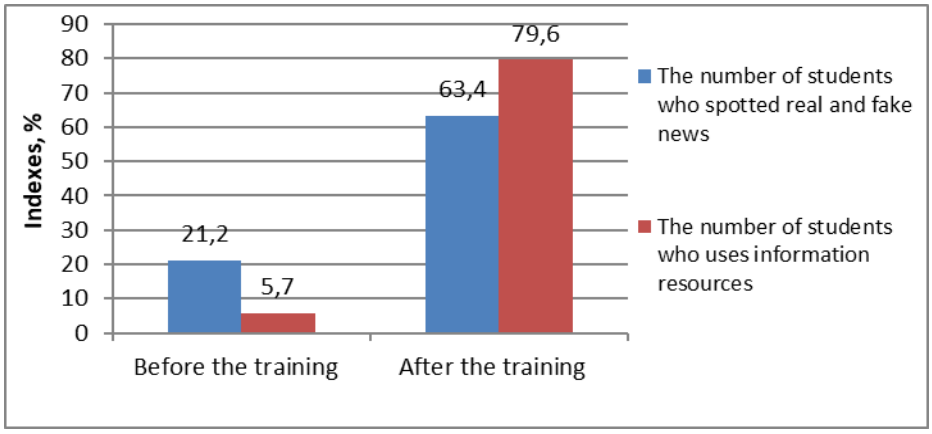

Fig. 3. The level of media literacy before and after the training.

4 Discussion

The analysis of the obtained results manifests that personal experience and the use of Internet resources make it possible to better get to know the technology involved in creating user-generated content. Students discovered that media can manipulate them if they don't understand the techniques. Furthermore, media creators use judgments to impose their opinions and to create images and textual content based on a task description. Students saw that any textual or graphic material is a product of human activity, thus it can be used for diverse manipulative purposes. Acting as a content generator in different situations, a student will be able to perceive information more critically, understand the way junk news is created, and how such can be verified by available technical devices.

Students noticed that the texts addressing our emotions have the greatest impact on readers' consciousness. Human emotions provoke an instant reaction and create favourable conditions for the rapid spread of fake news. Students also concluded that any information product of which they might doubt the veracity should be a subject of verification, yet it requires skills of working with information technologies to verify its truthfulness.

Our training sessions showed that the use of advanced technologies is an effective way to develop easy-to-use skills. The course can be used in both online education and practical classes for developing critical thinking in the frame of media literacy education.

Up-to-date information and communication technologies can be sources of misinformation, misunderstandings, and conflicts in society. However, at the same time, information technologies make it possible to master the skills necessary for understanding the basics of media and information literacy.

I recommend implementing our training in other media literacy courses. However, it should be noted that the number of classes and academic hours may vary according to age and social group appropriateness. I worked with students whose future work is related to information security, so five class sessions were enough for them to develop the required skills. I consider that the number of classes and examples of messages should vary depending on the target audience. Audiences of media and information literacy courses should be aware that information technologies provide an opportunity to acquire the skills necessary to verify and analyse media messages.

5 Conclusions

The aim of the experiment was to justify empirically the theoretical assumption that the proposed approach was really effective. The results demonstrated that the usage of technical devices increase the level of media literacy and stimulate students apply their knowledge in their everyday practice.

Thus, my study confirmed the hypotheses put forward earlier, that the use of technical means increases the effectiveness of media and information literacy training. Moreover, knowledge and skills in this area increase the probability of applying the knowledge gained in everyday practice. The high probability of applying this knowledge in practice is explained by the availability of technical personal devices, like mobile phones, gadgets, laptops, etc.

I consider our course to be an important tool for increasing the effectiveness of media literacy trainings for any audience. Therefore, I recommend its introduction into the practice of media literacy courses.

It is noteworthy that practical assignments (examples of messages, creative challenges, and tasks) should be selected by each teacher, depending on the age and social group. In the future, I plan to develop guidelines for the use of information technologies for media literacy training.

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