

The Stepchild of Informatics Education: File Management

Maria Csernoch

In the teaching of informatics/computer sciences/digital literacy, ICT, or whatever we name it, one of the most fundamental subjects is handling files. It is claimed – without any proof [2] [3] – that digital children are born with this knowledge [1], and students themselves are also convinced that there is nothing to learn in school. However, our recent studies clearly reveal that handling files is one of the most neglected subjects; consequently, it is heavily loaded with misconceptions.

The bombshell was dropped at the online AP (Advanced Placement) testing period in 2020, when thousands of students were unable to submit their pictures at the end: “How to deal with HEIC images proves to be the hardest question of all.” [4].

However, this example is only the tip of the iceberg. The attempts at helping students around the problem, the answers and solutions offered, the students’ petition to the AP board [5] (signed by more than 30,000, and still rising), and the search for the reasons why students do not know how to solve a simple file conversion problem is far beyond the scope of this piece of writing. The purpose of this letter is to call attention to the problem of the lack of fundamental digital skills and to show that both the education system and wider society is a long way from understanding the concept of computational thinking [6] and the urgent need to develop it.

Being illiterate is not a problem

“AP gives students the chance to tackle college-level work while they’re still in high school—whether they’re learning online or in the classroom. And through taking AP Exams, students can earn college credit and placement.”[1] The intention of AP is clear: to support the best students. However, what is unclear is (1) why colleges want digitally illiterate students, (2) if

colleges do not consider students' computational thinking skills, then why they test them at all, since illiteracy does not seem an obstacle to being accepted in tertiary education, (3) if AP students are the best, what is the level below them like?

Solution? Weak attempts

"...school's AP program forwarded an email from the College Board to students on Sunday including tidbits of advice to prevent submission errors." [4]

"College Board's website instructs students with iPhones to change their camera settings so that photos save as JPEGs rather than HEICs." [4]

The College Board tried to help these students, but it was still not enough: "I thank the College Board for setting up a re-submission channel for students taking APs this week," Sisman said in a statement to The Verge. "I urge them to be fair to students who've already taken the APs and can't submit them. Many students will be in the military or working at summer jobs by June 1st and won't be able to take the makeup test." [4]. "Now we might have to retake our tests several weeks from now or lose our chance to get college credit." [5].

"The College Board is now allowing test-takers who have issues submitting their tests to email them instead." [4]

There were overconfident illiterate students who did not listen, including those who "...air-dropped an iPhone image of his responses to his Mac and tried to convert it by renaming the HEIC file to PNG.", and kept complaining that "That nuance was not addressed anywhere in the demo." [4]. "...a senior in British Columbia, had the same problem with Computer Science A." [4][2]. The students' complaint is one of the object lessons of the Dunning-Kruger effect [7]: their ignorance prevents them seeing what they do not know.

No, the acceptance of digitally illiterate and arrogant students in tertiary education is not a response to the problem we are faced with. Students, instead of recognizing their illiteracy, went public and further spread their misconceptions. The College Board, instead of making it clear that computational thinking should be as fundamental as 3Rs (Reading, wRiting, aRithmetic) [6], and that those who do not have this competence would not be accepted, tried to find alternative solutions to relieve students' anxiety.

What's wrong in computer science education?

As has already been mentioned, misconceptions circulating in informatics education is

one of the reasons that digital illiteracy is completely accepted, and those who do – or try to do – it right are blamed. Another problem is rooted in the large software companies who are trying to sell their product, and make it as dull as possible. One of the most distracting messages which arrives from Microsoft is when one tries to change the extension of a datafile (a task related to the subject matter of the present paper).

Figure 1. Microsoft's reaction to a change in the extension of a datafile.

By renaming it, the datafile will not be unusable. The associated program will be different, consequently, the double click will not necessarily open the file. However, the file is as compact as before, and by running an application which can open the file and giving the Open command, the file will open without any problem. Yes, we can rename the file without doing any harm, but we must be aware that by changing the extension, the filetype does not change, only the associated program will be different. Why do one change the extension? (1) Unintentionally. Microsoft's solution to this: hiding the extension. (2) In the filename of an attachment, the string to the right of the first non-ASCII character is deleted (Microsoft does this), consequently, the file arrives without an extension. Intentionally, (3a) when one wants to hide the extension from overzealous systems. (3b) In case of .csv files – when comma separated values are open in a European or semi-column separated values in an English spreadsheet –, changing the extension to .txt is a great ease.

When handling files without extensions, Microsoft further threatens users without any reason, by telling them that the file could be corrupted or unsafe.

Figure 2. Microsoft's reaction to an attempt to open a datafile without an extension.

To further compound the problem, students trust Microsoft (more than their teachers), and they seem to be convinced that by changing the extension, the file will be unusable. However, when students are asked how to convert a file to another format, the most common answer is “by changing the extension”.

Figure 3. Microsoft's reaction to open a datafile in more than one applications.

Another commonly encountered misconception is that Read Only files cannot be edited, i.e. they are untouchable. The truth is that they can be edited, modified. The only restriction is that they cannot be saved with the original name. However, by changing the filename – either the name or the filetype – the modifications can also be saved.

Summary

In general, students' reactions to handling files is in complete accordance with the AP students' competence. We can conclude that downgrading (1) the necessity of developing students' computational thinking abilities and (2) teachers' role and responsibility in this process are two of the great errors in the teaching of informatics. It is high time that we left behind the falsely assigned user-friendly slogans, along with the widely accepted mindless, aimless navigation associated with surface approach methods. We should stop teaching software interfaces and start teaching computing, with the right proportion of fast and slow thinking [11] [12].

Solution

One of the solutions to the problem of teaching file management is the contextualized webtable® datatable conversion (WDC) [8], which is a TPCCK- [9], cognitive load- [10], and thinking mode-compatible [11] method supporting effective deep-approach problem-solving [12]. In this approach, tables or table-like structures, which are downloaded from the internet, and are converted to normalized datatables. In the WDC process, several file conversions are carried out along with data manipulations in various applications, primarily in word- and spreadsheet manager programs. One of the greatest advantages of the method is that it provides strong support for knowledge-transfer activities embedded in rich cognitive context. Furthermore, with this method informatics is expanded to end-user computing, available to all students, not only professionals. All these achievements are in complete accordance with Soloway [13] and Wing [6] claiming that computational thinking is a fundamental skill for everyone [6], not just for computer scientists, and all students should learn programming [13].

References

- [1] Prensky, M. (2001). Digital Natives, Digital Immigrants, From on the Horizon (MCB University Press, Vol. 9 No. 5, October 2001), Retrieved March 21, 2018.
- [2] Lister, R. (2008). After the gold rush: Toward sustainable scholarship in computing. ACE '08: Proceedings of the tenth conference on Australasian computing education. 78(2008), 3–17.
- [3] Kirschner, P. A. & De Bruyckere, P. (2017). The myths of the digital native and the multitasker, *Teaching and Teacher Education*, 2017, 67, pp. 135–142.