Resarch Project on crossplatform compatibility tools for a multimodal
approach in digital classrooms within the scope of BYOD
Theory Paper

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1.0 Introduction – The price for user friendliness

During the course ProPIC part one, I was once in a while pretty irritated by the fact that it ought to be obligatory nowadays to posses an iPad, just for accessing the data coded in the iBooks format, which pestered a bit my participation in this course. Although, products from Apple gained the reputation for being user friendly, especially since the development of apps, the price for their user friendliness is to be paid elsewhere.

First, iOS and other software products are not open-source; Microsoft is not different in that aspect. Therefore, nobody, apart from privy Apple or Microsoft employees, is able to evaluate if Apple's or Microsoft's operating systems and their respective programs are actually performing according to their descriptions and manuals. This concerns privacy and security issues. According to the motto "Public Money? Public Code!", associations such as the Chaos Computer Club (CCC), Digitale Gesellschaft, EDRi, Free Software Foundation Europe, Open Knowledge Foundation Deutschland and Wikimedia Deutschland demand from governmental institutions, that public tenders are to imply the disclosure of the source code.[1] Restrictive software licenses prevent cracking down on security loopholes, which throw the gates wide open for attacks on our digital infrastructure, national security and industrial espionage.[2] Even

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[1] cf. Frischolz, Andreas. "Freie Software: Wenn der Staat finanziert, dann Open Source." ComputerBase GmbH, 13.9.2017, https://www.computerbase.de/2017-09/freie-software-staat-open-source/.
[2] cf. "Offener Brief." Eine Kampagne der Free Software Foundation Europe (FSFE), 2018, https://publiccode.eu/de/openletter/.

though the latter might not be of any concern when using digital technology in school, I simply can not have my future students to be spied upon.

Second, the restrictive policy of interoperability between different OS, programs, apps or data formats make it difficult to induce digital technology into modern classrooms. I already gave an example of the lacking compatibility of Apple's iBooks format. It will work only on digital paraphernalia made by Apple. Why is this of concern if every teacher and every student will be equipped with iPads? Within the Apple family the products are well compatible. It will be of concern when a school or an educational institute is confronted with acquisition costs to be described in the in the next paragraph.

Third, when comparing the benchmarks for complete hard- and software solutions, Apple and Microsoft will cause enormous acquisition costs, which entail additional costs for every tiny program or app which has to be acquired in the future to keep the digital classroom running. Nowadays, most of the schools in Germany are not well funded. Of course there are some rich schools, which could afford converting their classrooms in digital ones. But most of the German public schools are underfunded. The KfW bank in Germany recently criticized a backlog of 34 billion Euros in capital expenditure on the German educational system.[3] In my opinion the underfunding of public educational institutes was continuing from then on. Albeit the payed lip service by certain politicians, especially before elections, not much has been changed according to the underfunding of educational institutes in Germany. Being underfund ensues, that the introduction of digital classrooms are not placed high among school's priorities.

2.0 The demand for digital classrooms

Considering the context mentioned above, it will be a difficult task to convert analogue classrooms in digital ones, as often required from industrial associations, some politicians and trade associations. Recently, I saw a demonstration for better education. There was a student who wielded a transparent, which indirectly demanded for a paradigm shift in modern education, similar to the communicative approach of the

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3 cf. Rossbach, Henrike. "Investitionsrückstand : 136 Milliarden Euro zu wenig." Frankfurter Allgemeine, 27.06.2016,
 http://www.faz.net/aktuell/wirtschaft/wirtschaftspolitik/investitionsrueckstand-136-milliarden-euro-zu-wenig-14311553.html.

1970s, which was induced by social changes.[4] In our case the yearn for digital methods in the educational practice, is induced by a technological changes. In my opinion the longed for paradigm shift may be denominated as "multimodal or digital approach". The term "digital classroom" might lead to misinterpretations, because it implies that all applied methods should be digital ones.[5] Considering the above mentioned demands for multimodal methods in education, we will recognize, that we deal here with a combination of a top-down and bottom-up process. That is to say, the majority of the society demands for this paradigm shift in education.

3.0 BYOD – A countermeasure against underfunding?

Taking into consideration the context in which the desired paradigm shift to the multimodal approach should be established, we will face a lot of problems. Unless you are a student residential in the Free State of Bavaria, whose government recently issued an investment program for digital education,[6] the enormous acquisition costs for hard- and software solutions are in my opinion the source of all evil. But there is help. In this day and age, adolescence which do not dispose of at least one mobile device are relatively uncommon. Hence, mobile devices are already available. The schools need to invest only in a digital infrastructure, which enables the application of mobile devices in classrooms. Bring Your Own Device (BYOD) is a promising solution for addressing a part of the enormous acquisition costs. Those who are not familiar with the concept of BYOD, may consult one of the numerous web pages which deal with the concept. The concept consists in the application of the already existing mobile devices for educational purposes.[7] With deciding on the BYOD concept, the next problem will arise. The students will appear with a colorful variety of mobile devices depending on the parents economical status, personal interests of the individual student, security and privacy awareness, and the influence of the students' peer group. Latter evokes mental pictures from the Course ProPIC I. Every member of the project team brought their own mobile

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4 cf. Grünewald, Andreas, and Lutz Küster, editors. *Fachdidaktik Spanisch*. Ernst Klett Sprachen GmbH, 2018.

5 In that case I am eclectic. I would maintain analogue methods, which are well established and result in good performance. I would abandon those, which do not fit the bill, and replace them among other things with multimodal ones. Well working and established methods could be enriched with digital ones.

6 Schedlbauer, Elena."Pressemitteilung Nr. 071: Freistaat investiert mit Masterplan BAYERN DIGITAL II massiv in digitale Bildung." Bayrisches Staatsministerum für Unterricht und Kultus, 28.02.2018, https://www.km.bayern.de/pressemitteilung/11146/nr-071-vom-28-02-2018.html.

7 The advantages and disadvantages of the concept shall not be part of this research project.

devices in compliance with the course description. These devices could be categorized in three groups according to their OS:

1. iOS for iPads and MacBooks
2. Microsoft Windows for laptops and netbooks
3. Linux and its various distributions for laptops and netbooks

The multimodal tutorials, which were designed in the iBook format, were not compatible with the OS from Microsoft and Linux. Whereas the students equipped with iPads and MacBooks were making learning progress, the groups 2 and 3 looked desperately for a solution, which in hindsight did not exist or could not be easily implemented. This problem was solved by the relocation from the university's class room to the ZBW, where iPads could be borrowed from this institution. Latter engendered new trouble – the unaccustomed operation of this mobile device.[8]

4.0 An incident to be beard in mind

As an adult and university student, I am resistant to certain levels of distress which was ensued by the mentioned situation above. Please imagine such a situation in a school's context which involves the BYOD concept. Whereas in the ProPIC I course the described situation could be determined as a minor mishap, must be inevitably determined as calamity in a schools context, especially when younger students are involved. Here, I would love to provide you, my highly appreciated reader, with an example from one of my practical trainings:

I visited an English lesson taught, by the form mistress, in the 5th form of a secondary school's class, which consisted of 15 students. In this class reigned already an oppressive atmosphere, because of the condition the classroom was in. I was not really a class room. It was merely a former and a small storage room, i.e. an appendix of a real class room, without any windows, which was equipped with a black board and the usual paraphernalia: chairs, tables, map stand and a teacher's desk. There was not even enough space for a cupboard. To reach their storage room, the students had to cross the

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8 I would like to use the occasion to thank one of my coeds for helping me operating this device.

classroom of another class. I could imagine that they have often been mocked by the students of the classroom to be crossed. Since the 5th form is the entry class of secondary education, I could imagine that they felt themselves not welcome to this school or felt being isolated from the other students, who could dispose of a well equipped class rooms. I have to admit, that the school was under construction and that the 14 students of the class in question descended from a class with 32 students. It is prescribed that classes which contain more than 30 students are to be divided into two classes. The other 17 students of that descent were allocated in a well equipped classroom, because they were the larger of the two groups. The English lesson was taught in this context.

It was a text- and exercise book-assisted lesson on English grammar, which was arranged as class discussion. All exercises of the textbook according to topic were already concluded within ta prior lesson. Therefore, the exercise book was applied. The exercise consisted in a cloze. As sure as eggs is eggs, one of students failed to bring his workbook to the lesson. It was exactly this student who often fails to bring the apt teaching material. I have to aggregate that it is usual in this grade, that the parents of the students help them to pack their satchels to ensure that the students can dispose of the necessary materials. The form mistress explained that his parents are very industrious and care for many things, except him. Latter was the duty of the grand parents, who because of their age often failed as well in this matter. Hence, the form mistress decided that he has to learn earlier than the other students to equip his satchel correctly by himself. He was provided with a list which told him exactly for every day, which course materials he ought to bring to school. He simply needed to adhere to this list. Unfortunately, this procedure often failed as well. One could have guessed that he failed in understanding what was required from him or that he did not understand the content of the list. No. He was simply lazy in this matter. Hence, his teachers decided that they would not provide him any more with substitute materials, i.e. copies of the required course materials. In the case of our English lesson here, the form mistress simply told him to fetch an empty sheet, to write down the solutions provided by his coeds and his teacher, to execute the exercise at home and to finally compare his work with his annotations. Then he freaked out. Although the interruption of the lesson, ensued by his breakdown, was short-lived, the release of adrenalin or noradrenalin into his bloodstream prevented him from concentrating on the lesson from then on. The negative

impact of adrenalin or noradrenalin on a learning process is sufficiently well known. The form mistress renounced in that case to request his participation. In my opinion this decision could well be justified, because a participation from his side could be only expected after his being calmed down, i.e. after the excretion of the adrenalin or noradrenalin from his bloodstream, which would have taken at least the rest of the lesson. After the lesson the form mistress admitted that this was a lost lesson for the affected student. A fact which was not ignored by both of us when we noticed him freaking out.

Later I reflected on the possible causes which triggered his breakdown. I am convinced that he was not annoyed about spending 45 minutes in class without making any progress in learning; not in the 5th grade. I am rather convinced that the context in which the lesson took place and his personal situation resulted in his breakdown. He must have felt the sensation of not being welcome to this school, not being supported by his parents and being excluded from the class discussion, because of the missing course material. Hence, he was fourfold excluded from other students of that school. I could imagine as well, that he feared, another exclusion from his playgroup in the evening, because of the extra task which had been demanded from him. Maybe he was annoyed at himself too, for his being lazy in not bringing his course material. All this must have had a negatively strong psychological impact on him.

Suppose that a planed lesson involves the concept of BYOD with multimodal learning contents and 20% of the 30 students involved do not have access to the content, maybe because they brought a mobile device which is incompatible with the data format the multimodal learning contents had been conceived in. As a consequence 6 of 30 students do not have access to the learning content. If we considerate the breakdown of the student above, we risk that a similar incident will unfold itself only multiplied with six. Even worse, these six students join forces and we created ourselves a mutiny. This is way I used the term calamity above.

One could adduce, that it might be possible to fetch some compatible mobile devices for the affected students provisioned by the school. Of course. But this entails spending time on fetching these mobile devices, spending time on getting them started and spending time on transmitting the multimodal content. Whereas 24 students are already making learning progress, our six affected students will either feel themselves

temporarily excluded from the learning group, which will be the case if younger students are involved, or they will become aware that they will have to close the gap between them and the already progressing students in order to entirely participate in the lesson's consolidating phase at the end of the lesson. Latter could be decisive for the exam at the end of the term. Anyway, a certain amount of distress will arise, which will have a negative impact on the learners' progress.

5.0 Finding strategies for introducing BYOD into the class

With regard to the so far mentioned circumstances, conditions and difficulties, it is of utmost importance to find strategies for introducing the Bring Your Own Device (BYOD) concept into our classrooms. One strategy could be the selection of data formats which are compatible with all mobile devices mentioned in chapter 3[9]. Another strategy would be finding programs and applications for the individual mobile devices which are able to execute the data format the multimodal learning content was created in. Very often teachers allow the students to access the internet for investigating on a certain topic or for finding additional information to the recently learned contents. Students who brought products from Apple to the classroom will obviously use the preinstalled web-browser named Safari. Newer Microsoft based mobile devices are preinstalled with the web-browser named Edge. Older Microsoft based mobile devices are preinstalled with the web-browser named Internet Explorer, whilst the users of open source technologies will apply web-browsers like Firefox or Chromium. It is possible to install Safari on a Microsoft based device. Firefox can be installed as well on Microsoft based platforms. In both cases a small loss in performance is to be expected. In the case of Safari on open source devices, e.g. Linux, it is not even to be found in the repository. On the bottom line all these different programs fulfill sufficiently the requisite to grant access to the internet.

6.0 Research project

My research project will focus, therefore, on finding useful programs, apps and data formats which could be used in language teaching in a school's context and within the

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9 See p. 4

scope of BYOD. I will have to admit that projects unfortunately entail the risk to be declared as failure, although all assiduous efforts were made. Sometimes, projects fail because of some banalities. In that case, I will recommend to keep all the work and documents, which will have been created so far. It happens very often that a change of external conditions or new discoveries in the future enable a consequential continuation of a project which once was put it on the back burner.[10] Certain scenarios   may arise in this connection:

1. A sufficient range of apps, programs and data formats will be found, which could be used in in language teaching in a school's context and within the scope of BYOD.

2. One branch of the mobile devices mentioned in chapter 3[11] is so protective on their programs apps and data formats, that they are incompatible with the other two branches.

3. Only an insufficient range of apps, programs and data formats will be found which could be used in in language teaching in a school's context and within the scope of BYOD.

Whilst scenario number one presents the best-case scenario, entailing that lessons could be executed without any incidents and difficulties, number three presents the worst-case scenario ensuing that schools are doomed to acquire as soon as possible a uniform IT infrastructure: a server, a WiFi network and mobile devices for each student. Case number two implies the banning of their branch from the classroom, because of a possible protectionism policy on their products. In that case the school is bound to acquire at least some mobile devices, which can be handed out to the students who

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10 Documents which were created with the help of Microsoft's Office 2003 for example could not be read by Open Office. With the help of Adobe's PDF format it was later possible to convert the documents. Of course that entailed to acquire Adobe's Acrobat Reader until open source converters were developed. With the release of Office 2013 Microsoft renounced to some extent its protectionism policy. Open Office documents were now readable and Ms Office was able to export its documents in the ODF Format. This is what I mean with *change in conditions.* //
I could imagine that some ProPIC members of future cohorts continue, enhance or improve my research project.
11 See p. 4

backed the wrong horse.[12]

7.0 Benchmarks

What do I expect from these apps, programs and data formats which might be used in the sake of BYOD? Which qualitative criteria should be applied to them for considering them worth being used within the scope of BYOD? I reflected on the following benchmarks:

1. Compatibility with all in chapter 3[13] mentioned mobile devices.

2. Interchangeability of the exercises' results between the mobile devices.

3. It must be possible to alternatively execute the lesson in an analogue way.

4. (Optional: All apps, programs and data formats offer full functionality on all mobile devices.)

The reason for the first benchmark was already explained in the chapters above. Interchangeability,   the second benchmark, will enable the students to compare their results within a pair- or group work arrangement to hopefully induce a coaching process. This would facilitate as well the consolidation of the learning content by mentoring or class discussion. In case of the third benchmark everybody knows that malfunction of technical devices ironically occur at the least appropriate time. In case of an internet research, a server outage would be a possible scenario. Benchmark number four is optional. Due to the fact that certain apps, programs and data formats offer a wide range of functionality, I expect it to be nearly impossible as a single person to inspect all of them. Of course I will mention functional limitations, if I stumble upon them.

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12 In that case this research project hopefully will empower the teachers to be aware of this setback and prepare some mobile devices prior to the lesson preventing the scenario described in chapter 4 p. 4ff.
13 See p. 4

8.0 Objective of the research project

The objective of this research project will be the creation of a table which will exhibit a small range of apps, programs and data formats, which could be used in the BYOD context and which will state their performance with regard to the benchmarks.

I have to clarify that the objective of this research will not consist in investigating how effectively and with which learning content the certain apps, programs and data formats can be introduced into the BYOD context. My concern is a more technical one. In-stead of asking how they could be used in class, I am asking if they could be used in class at all. Like a mechanic who receives a giant tool box. First, he inevitably will sort out all those tools which do not suit his purpose. From now on, I will refer to the apps, programs and data formats as tools.

After the valuation with regard to the benchmarks, I will rank the tools with the help of a well known procedure, which is applied by the "Wine"-community. Wine is a tool which enables Linux users to install Microsoft tools on Linux based platforms. Depending on the Microsoft program this procedure works well, less well or not at all. These programs will be awarded with medals: platinum, gold, silver according to their functionality within the Wine environment.[14]
I intent to do this as well. I reserve the right to add to the medals bronze and rubber; rubber for not working at all or to issue a warning about that there will be lots of trouble ahead when trying to make a tool executable on one of the mobile devices.

9.0 Internet based research

I learned very early that in case of using IT based tools, that the best source for research is the internet itself. Because if this I will primarily base my research on the internet. If, for example, Microsoft states on their web-page, that they will not integrate a compatibility layer for example in Microsoft Power Point which enables a possible execution of presentations created with other tools and, for example, the open-source community confirms that this, even though they made every effort to come up with a

14 cf. Aaron Arvey et al. "WineHQ." WineHQ organisation, 17.08.2018, https://www.winehq.org/.

solution, I will not start acting on my own account. On the contrary, if a solution was already suggested, with some prospects of success, I will try to follow the provided instructions.

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