

Broadcasting Education - National & Transnational: A Heuristic Evaluation

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Abstract: *Television-like transmissions and multimedia productions were not thus far the main instigation force for replacing an instructor-centered agenda to a student-centered activity. The change abruptly brought into the educative field due to the Covid-19 pandemic has reoriented the Distance Learning nomenclature to product-driven processes, aiming to educate a global student community. As advances in infrastructure technology under the prism of remotely working have promoted within a few months tutoring and instruction to the most isolated places of educative jurisdictions, the schooling population, along with their families have adopted very fast instructive strategies that turn households to advanced hubs for receiving training. The target audience is punctually shifting to digital age recipients and users of online services and support solutions. The impact of new technologies on newly shaped societal frameworks, heavily dependent on Media and Tools along with vast Computer and Communication resources, is thoroughly examined for its Online Learning potential.*

Keywords: *multimedia learning; covid-19; usability; interaction; national and transnational distance learning*

1. INTRODUCTION

In the economic continuum it has been habitually quoted that "home is where the job is". Paraphrasing the meaning, using different arguments, the recent pandemic has repositioned the structure of a University campus.

It was commonplace for Academic institutes offering advanced learning to boast for their high-quality buildings, support (to learning) infrastructure and teaching amenities. It is not very clear how valuable these assets may be in meeting commitments or legacies for teaching during lockdown [1]. Have, indeed, Academic Institutes transformed themselves to Open Universities or Distance Learning providers?

The answer is not merely a point of strategic reorientation, especially in the field of education, as it would be, for instance, for the hard-stricken field of tourism or catering. In these grounds of economic activity, commercial organization and operational research prevail, letting down any other cultural or humanitarian consideration [2].

However, as the harsh financial reality would more accurately refer to a catastrophe with minimal, thus far, response from relief agencies worldwide, the next model of education in perspective is of crucial importance. Schools are usually built where economic activity brings people together, but, in terms of tertiary education, thousands of students

and staff flock around established institutes [3], reversing this order, obviously investing in the valuable asset of establishing professional qualifications. Return on Investment (ROI) seems to be a crucial parameter for such an attitude [4].

Conversely, notwithstanding these analyses that are currently short of long term envision, future possibilities in this research will be limited to the Academic consensus and not to the overall macroeconomic factors of goods produced and services provided in specific regions and their ramifications to the society (that supports learning and instruction).

In online environments content is the king [5]. As it was realized during the Covid-19 lockdown, expenditures for e-Learning content alongside the investment on tools for the development and provision of full-time remote instruction exceeded by far any spending on the usual coexisted actions: accommodation, meals, libraries, facilities for promoting collegial interests and activities. Needless to say, most of the planning effort in Departments and Faculties was focusing on the instructional design of Computer Based Training (CBT) and the health maintenance organization leaving all other registered issues of their agenda to the background.

Designing innovatory learning environments is of crucial interest to the Academic community. If online teaching retains limited involvement, not

many dynamic exchanges and a not very interactive configuration [6], then, it is not guaranteed that Academia as is will remain the effective center of the social and economic activity.

2. FROM DISTANCE LEARNING TO BROADCASTING

ICTs in Education have been promoting Web 2.0 and Web 3.0 tools along with all kind of installations that mobile equipment may bring to instruction (thus, Web 4.0). These new habitats are not just digital places offering alternative forms of education: they morph student – centered environments, which have advanced communication potential, provide collaboration channels and exchange of ideas between students and everyone involved in technology-supported instructional processes.

Generally speaking, these collaborative environments promote the notion of teleworking. As members of a network seek to increase exchange and interaction between people, designers of CBT courses seek to involve new technologies that enhance the standards of teacher–student communication. Accordingly, Distance Learning develops to an attractive multimedia experience and a lucrative commodity.

Contemporary practices since 2000 have been mainly featuring multimedia systems with “widespread distribution of instruction through various media” [7] like printed material, audio and video broadcasts, television and interaction with Learning Management Systems (LMSs).

More recent advances in mobile, pervasive and ubiquitous computing clearly promote a massive CBT agenda. Whereas, thus, far interaction in University courses was experienced at a rather limited level (mainly as personal interaction among tutors-students and learning was only possible from the student just by interacting with learning content), recently interaction has been fully bi-directional by all involved stakeholders (learners, educators, material).

Clearly, a major shift in the learning paradigm has been reported: widespread procedures referring to a large community of recipients are encountered. New ICT tools have gained global acceptance and recognition promoting an online educative system highly dependent on vast conglomerates, the very same mode that Educational TV was reliant to other than normal educative processes for its distribution. On the other hand, these large global corporations have empowered strong interactivity during the lockdown, enabling education to survive the crisis.

Preexistent social networking was also used for educational purposes (extensive chatting among students, teachers, exchanging articles or featuring videos, sharing posts, creating groups that enhance

engagement to learning material) motivating students to stay active, to achieve better grades, to push for a better understanding about a course, overall engaging them in higher levels of increased satisfaction as far as the University learning experience is concerned [8].

As seen in Fig. 1, what instrumentation may be used by students to regain control of remote learning, along with entertainment and connections to one's private life or professional needs is heavily dependent on the corporate tools offered by the dominant players of the field - in this example Apple iPhone™, Google™, Facebook™ (aka FB), et al.

Native App	Daily Usage	Web App	Daily Usage
Messenger	30%	Safari	25%
Reddit	25%	Moodle	20%
Spotify	10%	YouTube	20%
Safari	10%	Spotify	10%
YouTube	5%	Slack	10%
Facebook	5%	Reddit	5%
Gmail	5%	GoodReads	3%
Google Maps	5%	Webmail	3%
Google Drive	3%	E-banking	2%
Google Calendar	2%	Pinterest	2%

Figure 1. Typical usage of a student's mobile device during the Distance Learning transition for synchronous and asynchronous instruction due to the Covid-19 lockdown.

As interactivity and education can be identified with multivariable statements, a single definition would lead to erroneous predicates. Both terms have many shades and magnitudes, leading to some sort of affirmed arguments: for instance, Zoom-ing has the same nomenclature effect for Distance Learning with what FB implies for social media.

Therefore, Interactive Educational TV (aka IETV) as a learning experience would predominantly involve the experience that a viewer senses while watching an educational program. When interactivity and education are on the same sentence or connected in a single way, obscurity evolves about education from distance. When an applicable model of interactivity gives answers or simplifies problems probated on distance education, then it can be ascertained as leading the way to applicable digital services for learning with video lessons [9].

3. AN EMERGING CULTURE OF DISTANCE LEARNING WITH BROADCASTING

The continuing lockdown in education seems to be lasting for good or, at least, intended to remain unchanged for the Academic foreseeable future: most Greek Universities, amongst them the Aristotle University of Thessaloniki, have planned to have September exams in remote mode.

The lockdown of all in situ educative provisions had commenced on March 10, 2020 as a horizontal action plan by the Greek government at all levels, from nurseries to universities. Since May 11, 2020, schools commenced to gradually re-open, entrance examinations for tertiary education institutes took place between June 17 and July 10, 2020, and a very limited portion of formal Academic activities, like written examinations took place in Universities or Secondary Schools. It is not clear yet, in what mode and to what extent normal schooling will be operational in September 2020.

Furthermore, it remains unclear to perceive what obstructions or undesirable trends will be presented for new students in Academia, in October 2020. Will they seek to relocate themselves in the cities where their University classes are localized, or will they stay tuned at their parental premises awaiting for the production and marketing of new styles of learning modes?

3.1. The Case of Greece: National Portals

The National Digital Academy of Greece (<http://nationaldigitalacademy.gov.gr>), as of now, July 2020, hosts 214 different lessons in 6 different categories. These groupings are:

- I. Communication and Cooperation
- II. Internet
- III. Tools of Daily Usage or Everyday Tools
- IV. Digital Entrepreneurship
- V. Computer Science
- VI. Cutting-edge Technologies

More specifically, each of these categories focuses on:

- ❖ Communication and Cooperation: It contains 4 different sub-categories, which are, *Mobile Devices, Social Networks, Communicating apps, Work from Home*. This category hosts 25 lessons from different content providers. 23 of them are providers of private funding and 2 of them are from public.
- ❖ Internet: It contains 4 different sub-categories which are, *Safe Browsing, Search Engines, Privacy Settings, Development and Evaluation of Content*. This category hosts 25 lessons from different content providers. 13 of them are providers of private funding and 12 of them are from public.
- ❖ Tools of Daily Usage or Everyday Tools: It contains 2 different sub-categories, which are, *Desk Applications and Usage of PC*. This category hosts 37 lessons from different content providers. 30 of them are providers of private funding and 7 of them are from public.
- ❖ Digital Entrepreneurship: It contains 4 different sub-categories, which are, *Digital Marketing and Modern Business Framework*. This category hosts 18 lessons from different content providers. 9 of them are providers of private funding and 9 of them are from public.

- ❖ Computer Science: It contains 12 different sub-categories which are, *Development of Internet Applications, Development of Mobile Applications, Development of Software, Data Bases, Communications Networks, Human-Machine Communication, Programming Languages, Cyber Security, Operating Systems, Device Programming, ICT and Education*. This category hosts 81 lessons from different content providers. 54 of them are providers of private funding and 27 of them are from public.
- ❖ Cutting-edge Technologies: It contains 4 different sub-categories, which are, *Big Data, Machine Learning, Artificial Intelligence, Cloud Computing*. This category hosts 44 lessons from different content providers. 43 of them are providers of private funding and 1 of them are from public.

There are 32 different content providers to the National Digital Academy of Greece.

From these, 14 of them are Universities or institutions of public interest or non-profit organizations:

1. Aristotle University of Thessaloniki
2. E-Learning Distance Programs for Professional Training
3. National Technical University of Athens
4. Greek Open University
5. Economical University of Athens
6. University of Western Attica
7. University of Western Macedonia
8. University of Ioannina
9. University of Patras
10. Academic Network GUnet
11. National Center for Safe Network
12. Organization of Open Technologies
13. Unit of Organization and Management of Developing Programs
14. Government site about Education

18 of the providers are foundations or institutions that are having considerable connection with private funds [3]:

1. Vodafone foundation
2. Piraeus Bank foundation
3. Alpha Bank foundation
4. Eurobank foundation
5. eTwinning
6. Mathesis
7. OTE academy
8. SaferInternet.gr
9. Inte*learn
10. SQLearn
11. Amazon
12. Cisco Networking Academy
13. Coursera
14. Edx
15. Google
16. LinkedIn Learning

17. Microsoft
18. Oracle University
19. production and marketing of new styles of learning modes?

3.2. Transnational agendas

Already esteemed Institutes have excelled in offering Distance Learning courses at all levels, modes and methods of operation.

Since 2010 most well regarded American Institutes have been designing apps offering instruction for Mobile Devices and Interfaces, thus setting within easy reach very prestigious lecturers.

Through schemes like UCTV (University of California Television), MIT Open Courseware, or TED video lectures the most far ahead in development and delivery educational content may be accessed. For starters, free of charge or with limited endowments and contributions.

Even further, antipodal courseware, thus far failing to be noticed may be brought to the surface of collective global learning. Podcasts, videos and learning material from the Australian National University or even the Khan Academy of Pakistan lead aggressive strategies far beyond the capacity of these countries to have effect on tertiary education.

It seems that a culture of massive learning has been initiated with MOOCs. Big players of this game seem to be American, English, Western European, Indian, Spanish, Brazilian institutes that cater for the linguistic pool of mother tongue resources.

However, for STEM (Science, Technology, Engineering and Mathematics) courseware, English seems to be the "native" language for instruction.

Even students of local Universities, being offered instruction in their formally accepted language would turn to English for learning Technology related subjects, promising this way to turn a honest penny from work in progress. Thus, it was not that astonishing that Universities in Greece have begun to offer courses in collaboration with renowned global education players, influential in their affective modeling for learning [10].

4. DIFFERENT EVALUATION PROCEDURES AND THE NEED FOR HEURISTIC EVALUATION OF INTERFACES

Notwithstanding how most Academic Institutes coped in their ardent transition to Open Universities for the spring semester 2020, the crash-tests for viable, en-masse Distance Learning retain the formative and formal evaluation processes adopted.

Already the literature offers previous examples of how well such a transition may serve educational processes. For instance, how viable is it to offer Medical accreditations via remote learning methodologies [11]?

4.1. The Aristotle University of Thessaloniki: a linear perspective

Within the Aristotle University of Thessaloniki, Greece, in its diverse fields of instruction, like Informatics, Legal studies, Medicine, etc. different pathways have been developed to conclude formal evaluations for the Covid-19 hit semester.

Extension was provided to the usual period of 13 teaching weeks per semester, to fill in any gaps, and the final examination period commenced in June 15, 2020. In most Departments the evaluation phase lasted some 4 weeks and by July 23, 2020, most formative evaluation assessments, including supplementary activities, had been completed.

For the first time in AUTH, probably the biggest Institute in South-Eastern Europe, 97% of the examinations took place by Distance Learning techniques. However, technological glitz seems to come short in providing creditable supervisor call instructions.

Instructors used a variety of techniques to assess the students' performances. The most difficult phase included creditable supervision and inspection of student classes that varied in pre-graduate courses from some tenths of students, in elective lessons, to more than 500 in certain core courses of populous departments.

To avoid hard proctoring techniques that may violate General Data Protection Regulation (GDPR) rulings concerning Personal Data violations, the use of perpetual camera-initiated supervision was not the most favorable technique.

The main problematic situation, albeit the use of AI or Machine Learning, appeared to be the issue of third-party involvement in all examination procedures.

Some of these interventionist practices have a cover of legitimacy for the state, like paid tutoring offered by third party equipage, while others seem to be adopting cloak-and-dagger intel operations. In hi-tech mode, that is.

To avoid excessive exposure to machine-assisted boost of performance or, even worse, duplicity and fraudulent representation in the other aspects of the assessment-chain procedures, instructors used their imagination so not to let a culture of cribbing prevail.

For instance, the Turnitin™ Machine Learning tool was used to indicate what portion of the answer sheet had been copied from other public resources, or perhaps, co-students participating in the same assessment. Indeed, plagiarism seems to be plaguing tertiary education.

However, the issue is more complex and no efficacious methodology has been endorsed for copying from someone else or promoting others' ideas as if they were the examinee's own work.

As a result, most professors concluded that the intelligence of such tool is highly predictable, letting room for repudiatory breach of the examination agreement. In other words, anti-theft and anti-plagiarism systems may be used as counseling tools to direct the examiner to hidden weevil attitudes, bugs and similar patterns of cheating, but not *per se* as absolute criteria for revealing unfairly acts to gain an advantage. Unless, of course, a case of outrageous or provocative falsification is met.

In practice, during this first period of the pandemic lockdown, examiners preferred more classic methods of authentication. As seen in Fig.2, left, for formative evaluations topics where examinees would develop in small groups talented approaches were opted in [12]. For final examinations, students were asked to answer the examination sheet in writing with a pen, to photograph it or scan it, bundle it in a pdf file and upload it the Learning Management System. All these in a rather limited time interval, so to dissociate cases of deceptive functioning during remote mode.

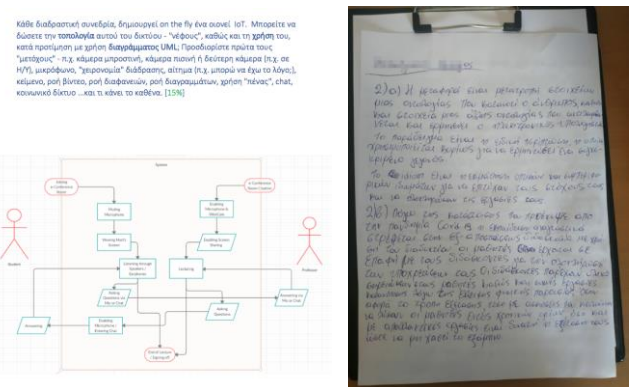


Figure 2. Examination answering sheets for formative and final assessments that have been uploaded to the AUTH's official e-Learning module in 2020.

It is suggested that the answer sheets should be kept in digitized format for quite a while.

4.2. An erroneous perspective

Contrary to the prevalent public opinion belief in Greece, a variety of Universities abroad, some of them being prestigious, are not deploying structurally different methodologies for accrediting or standardizing their students' assessments. Especially when under specific circumstances, the Institution may be asked to prove if the proper education and accreditation is delivered to the student body.

For example, a lot of medical schools have been asked in the past to prove the quality and the amount of education provided to doctors in malpractice trials. The better way to ensure, that inside the adequate instructive practices and methods have been provided to student is to demonstrate the forms of past exams, and the actual answers provided by the examinees.

It is a type of assurance that is common to all levels of education, to each and every civilian practicing scientific applications to different layers of the society, for centuries. It happens, though, even for major institutions around the world not to use a very different evaluation approach when it comes to pathways that have a large proportion of theories and not so many practical lessons. Especially in medical cases, for example. Indeed, despite the fact that the last two years of the study curriculum are coping mainly with practical applications, in as small as possible groups of trainees, neither teamwork nor some kind of hands on accreditation may guarantee the risk of incomplete, swallow assessments. Hence the risk for improper or negligent professional activity.

Even worse, if the knowledge gaps are localized on the first years of study, when the theoretical foundations of each and every science are underpinned, the exercise of a profession becomes a battered industry.

According to a rule of thumb concerning the worldwide teaching agenda, the degree of concluded findings regarding the ability to exercise a profession by an individual is proportional to the proper completion of a proposed program of studies with its accredited practices included. It is a way to state that an educational program has been adequately monitored by a mixed board of authorities (state, educational, professional, etc.) and thus qualified for learning.

Thus far, however, although acknowledged as rather incomplete, there has not been found another alternative way to provide a solid proof that the student has already established the sufficient amount of knowledge than that of paper exams.

Provided, of course, that no intervention has taken place in the astuteness of the examination processes.

Further accreditation practices are building up, over a period of time, the practitioner's profile to cope with the more complicated hazards of his profession.

4.3. A common free-type evaluation

On the other hand, when there are not solid, mandatory theoretical backgrounds leading to practical lessons, educational procedures may rail themselves to more fruitful pathways, enhancing both student-instructor interactivity and class creative activity.

It is exactly this point that has been hurt for classic Universities, like AUTH, in their educational transformation during the Covid-19 lockdown.

It should be pointed out, though, that this happens because the nature of studies in Academia is linked with innovation and research, and as such reforms on the fly rework drastically the type and methods

of the education offered. Intuitive instruction adheres beyond formalism, has no real boundaries but the ultimate goal to educate the student in the best possible way.

Therefore, instructors are teachers, researchers and methodology providers the same time.

A brief example will be presented by considering the Ravensbourne University of London, UK. This particular public University was established to its current modern form in 1962; during the Academic year 2018-2019 a student force of approximately 2500 learners, both undergraduates and postgraduates, was commissioned to it.

Furthermore, it employs some 150 educative staff and mixed-duties workers, with a considerable variability in their job description.

According to its mission statement, declared in its website, Ravensbourne University is an innovative, industry-focused University which emphasizes on creativity and collaboration, aiding students in reaching the ultimate goal, i.e. let its learners obtain special skills and professional knowhow for a career in digital media and design [13].

When a tertiary institute or a faculty has such operational characteristics, then it develops more degrees of freedom so not to rely on the strict paper examination methodology for its formative and final assessments.

For example, a simple evaluation procedure may develop in three phases (for a typical semester period):

-Phase 1: The Foundations

Commencing the course, students assume the theoretical foundations of the subject taught. In class activity relies on presentations, in detail explanation of the topics involved and interaction with the students. They are encouraged at every step to give their feedback, to provoke discussions and to indulge themselves to the library for extensive study on the thematic resources.

This period has an endurance of 4-5 weeks.

A mid-term formative evaluation resumes this part giving the chance to both instructors and teachers to conclude on the progress of the theoretical learning. The answer sheets of the exams are digitized and kept in the courseware's archive.

- Phase 2: Formative Evaluations

This stage involves skill development, based on technological equipment provided by the University's resources. Students, either alone, or usually in small groups, advance practical teamwork by adhering a project with very clear, solid deliverables (Fig. 3).



Figure 3. Deliverables from Phase 2 (multimedia files alongside documentation) - this snapshot comes from a video file describing what a specific group of 4 students managed to achieve in AUTH.

In this phase, students learn by hands-on applications. The instructor provides the outlines, suggests bibliography and gives answers to feedback questions coming from the students [14].

Each team is encouraged to develop its dexterities, with guidance concerning the outcome and predominantly learners are motivated to use all the technological equipment made available to them and enhance skills that are coming through equipment know-how.

Formative evaluations and project development, along, perhaps, another midterm examination, either in oral presentation form or somehow written, last for another 4-5 weeks period.

- Phase 3: Final Evaluations

The finishing 2-3 weeks are dedicated to deliver the final project of the semester using standard, more or less procedures for the presentation, explanation of the project and, perhaps, the "public" release of its deliverables.

Industry standard tools - like the Turnitin™ platform - may be used, ensuring that the final project is evaluated in a proper and generally accepted way.

Indeed, in some AUTH departments for instance, a public exhibition of the deliverables may be organized, without however conveying to the audience the marks of each project or other details that GDPR restrictions prohibit from releasing, so to catch up with the views of the general public.

In case of written examinations, impartiality along proof-reading, accompanied by keeping the archived documents for quite a while is technically established.

In most cases for small in size classes usually there is little need for paper exams because the quality and authenticity of the last stage deliverables is cross-validated in a commonly agreed way.

Nevertheless, supervised written examinations are a fail-safe method for preventing malpractices, globally accepted and recognized, especially in times of trouble.

5. DIFFERENT EVALUATION PROCEDURES AND THE NEED FOR HEURISTIC EVALUATION OF INTERFACES

As it becomes evident world wide that education is shifting to broadcasting methodologies to carry out it's functioning in cases of prolonged lockdowns, cooperation between tutors and learners remains a keystone priority for successful evaluations [14].

The following heuristics [15], i.e. broad rules of thumb are of importance for delivering feedback and interaction [16]:

I. Visibility of the system status

The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

II. Match between system and the real world

The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

III. User control and freedom

Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

IV. Consistency and standards

Users should not have to wonder whether different words, situations, or actions mean the same thing.

V. Error prevention

Even better than good error messages, is a careful design that prevents a problem from occurring in the first place.

VI. Recognition rather than recall

Minimize the user's memory load by making objects, actions, and options *visible*.

VII. Flexibility and efficiency of use

Accelerators — unseen by the novice user — may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users.

VIII. Aesthetic and minimalistic design

Dialogues should not contain information which is irrelevant or rarely needed

IX. Help users recognize, diagnose, and recover from errors

Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

X. Help and documentation

Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation.

How these principles were applied in practice [17] [18], will be demonstrated within a formative

evaluation example, from the *Computer Music* course in AUTH. It is an elective, attended by some 50 students each year. The following two-way flow of visual information took place:

A. The students were presented with an IETV video, in which Professor N. Paris and Erasmus+ student B. Y. from Ankara, Turkey, performed a well known tune in Mode 5 (Hypo Dorian - and at some points Phrygian).



B. The distinguished performer from Turkey did not know either the Greek language or Byzantine Music notation, but followed with his tambour the score in the analogous *maqam* scale, performing with Donizetti-like alterations the Common Music Notation (CMN) semiology of the prototypal melody.



C. The music piece is very familiar in the Balkans, Asia Minor and Middle East as for at least 8-9 centuries it is sung accordingly (and danced "symbolically") in weddings, inaugurations and other liturgical celebrations. Therefore, students were presented with an accompanying video, along e-bibliography and other public resources on the Internet to catch-up with the theoretical background. (Picture cropped from social media uploaded video)



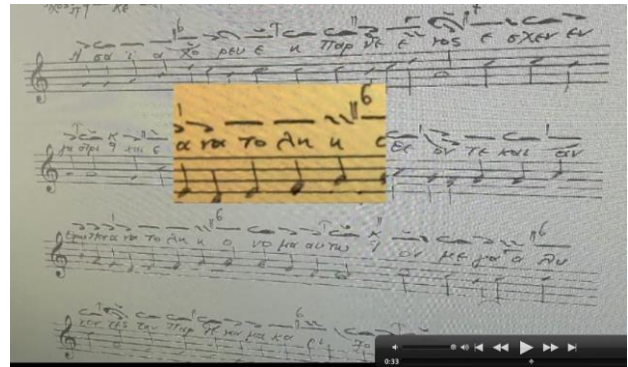
D. Students were asked, if they are competent at playing stringed instruments, to reproduce the melody as close as possible, and upload audiovisual feedback. Some did so by using Eastern instruments, tuned in non-CMN chromatic scales.



E. Other students used well-known Western music instruments, like the bass, to approximate as possible this diachronic tune with well-tempered scales.



F. The ones who could not use stringed instruments deployed appropriate Computer Music software, score editors and Digital Audio Workstations to reproduce the tune synthetically.



G. Formative Evaluation:

Students could ask questions, inquire for more theoretical or practical insight, via e-mail, phone or videoconferencing sessions. The instructing team would request involved students to make amendments or eliminate mistakes. Iterative uploads could repeatedly take place.

H. Final Evaluation:

Along written exams and other assignments, audiovisual submissions comprise important elements upon which the final mark depends on.

6. CONCLUSION

Audiovisual feedback and interaction pose unprecedented standards for reciprocal, twoway high-level communication between instructors and students, promising a viable possibility for continuing tertiary education, without flaws or uncharacteristic blemishes in cases of prolonged lockdown.

Student engagement retains features of high visibility, thus attracting the attention of class members for reciprocal action at every stage of the teaching process.

Clarity, intelligibility and beyond all transparency is achieved.

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