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Is the flipped classroom model for all? Correspondence analysis from trainee instructional media designers

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Abstract The educational potentials and challenges of "flipping" a classroom are today well-documented. However, taking into account the contradictory results, literature on the benefits in using the flipped model as a socially inclusive technology-supported instructional design model is still in its infancy. This study seeks to investigate the perceptions of twenty-six ($n = 26$) trainee instructional media designers based on the access and use of a flipped instructional model, following an exploratory mixed method research with quantitative and qualitative data that was framed by learning concepts. Findings indicate that the flipped model supported really well exercises facilitating trainees' participation, particularly those with specific reference to gender, age and web-based open educational resources (OER) level of frequency use. Regular recordings of difficulty with long-time content lectures were perceived as the most effective for flipped instructional model use showing that course design matters for knowledge gain. The study results also confirmed the view of flipped classroom as facilitating model for learning activities with trainees to be actively participated and not being passive receivers of the main instructor's information or observers of other colleagues' practices and experiments. In this context, which is defined by severe resource constraints and fear of using web-based transactions or sources among lecturers and trainees, the simplicity and accessibility of a flipped model promises a successful adoption for instructional media technology in Higher education.

Keywords Flipped classroom · Instructional media design courses · Video lecturing · Students' socio-cognitive background

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1 Introduction

"Instructional design" is a term that encircles theoretical and practical research in the areas of cognition, educational psychology, and problem solving (Broderick 2001). It is generally focusing on the creation of an instructional environment and learning materials that will bring learners from the state of not being able to accomplish certain tasks to the state of having the ability to accomplish them. Due to the surge of innovation in the field of Information and Communication Technologies (ICT) over the last decade, it is now easier to access online study materials, stream learning content, and use devices, such as tablets and smartphones for educational purposes. This perspective presents an opportunity to rethink an alternative way of learning and teaching within an innovative education context. In general, instructional media design involves innovative ways of presenting the learning material based on learning objectives and requirements exploration from different resources for a specific educational course. By designing, creating, or testing multimedia resources can be satisfied severe learning objectives using various media, which can include slide presentations, video, text, Web pages, audio files, and digital software (Reisser 2016). In instructional media design courses, students (henceforth called "trainees") aim to create and manage multimedia products that help other people learn both inside and outside of traditional educational settings. Therefore, instructional media design courses need to assist trainees in achieving their learning objectives not only effectively, but also efficiently by supporting the effort of understanding in a faster and more purposeful way (Zhang et al. 2016).

Internet access and advances in Web-based media sources over the last decade present an opportunity in educators' circles to rethink the way of teaching and learning innovative contexts of instructional design courses in Higher education. The latter category includes teaching, learning, and research materials in any medium that reside in the public domain or release under an open license that permits their free use and re-purposing by others. Releasing an open license content, it is permitted access, (re-)use and redistribution to others without or with limited restrictions (Atkins et al. 2007). Trainees in instructional media design courses should always try to create and manage multimedia products that help other people learn inside and outside of traditional educational settings with (web-based) open source educational resources (OER) (Unesco 2015).

It is widely recognized that exposing trainees to content materials in a long-time lecture is not enough to enable them conceptualizing and understanding concepts taught (Lujan and DiCarlo 2006). This is observed from students who not try so much find alternative web-based resources in order to enhance knowledge gain (Kanuka 2006). When lecturing in the higher education context, many times a traditional face-to-face instructional approach to lecturing is often being followed, with little integration supported practice-based tasks of technology in teaching and learning (Pellas and Kazanidis 2014; Rolfe et al. 2008). Various are the reasons, not only on institutional constraints due to lack of infrastructure and resources, but also due to several challenges related to lecturers' attitudes toward technology in terms of lack of time and support (Gilakjani et al. 2015). This warrant further study into the integration of technologies, and especially web-based OER in instructional media design studies that are context-aware, socially inclusive and are both low in the need for the development and use (OPAL Report 2011).

The field of instructional technology in university-level courses has tended to give sometimes little or no formal treatment on the importance of creativity in instructional

design, although that students struggle to understand how to utilize effectively media resources (O'Flaherty and Phillips 2015). With the rapid advancement in educational technology, previous studies (Clinton and Hokanson 2011; Gilboy et al. 2015) support the opinion that the use of technology across instructional media design courses is only one part of the problem. The other one, is how teach students to produce their own educational media using the appropriate learning strategies or teaching methods in the interest of delivering or managing the educational material from other digital sources and achieving positive results in understanding the educational concepts efficiently. Therefore, instructors face a major challenge on how to improve the performance of students in developing instructional media courses affecting positively their instructional practice and continuous improvement (Flumerfelt and Green 2013).

Web-based OER allow pervasive access to multimedia content. Instructional designers have already recognized the opportunities created for more personalized learning experiences and increased students' engagement. For this reason, educators and researchers seek to investigate the benefits of using alternative strategies and teaching methods to engage and motivate students with different socio-cognitive background in the learning process (Lanham et al. 2013; Mossley 2013). "Flipping" a classroom is a notable option. As a term, it is generally used to describe a pedagogical approach, in which instructors reverse the traditional lecture (synchronous) in contrast to homework (asynchronous) activities (Bishop and Vergeler 2013). A flipped model involves moving appropriate from lecture content to web-based videos that students watch before attending in class. In-class activities are then designed by the instructor to answer questions, provide the appropriate feedback or uncover common misconceptions of students (Porcaro et al. 2016). While Davies et al. (2013) found that gender, age and Internet access did not have any impact on students' engagement with flipped method, other studies (DeLozier and Rhodes 2016; Mason et al. 2013) show the pedagogical benefits in using flipped class and argue that a high number of their study participants did not engage in this type of class, beyond of their demographic backgrounds (Nguyen and Coryell 2015). In summary, students, regardless subject of study, are demographically different not only on their conceptions, but also on their perceptions.

This work reports on students' perceptions on the pedagogic value that flipped class use can give for teaching and learning instructional media design courses at two Greek departments, during the Easter semester in 2016. A total of twenty-six ($n = 26$) trainees (participants) took part in six lecturers with their courses to cover a wide range of lectures, in which the main instructor-researcher tried to teach what skills should a contemporary instructional media designer need to have so that can respond efficiently in today's challenges. All courses for all trainees had a theoretical part, i.e., learning about the use of contemporary learning theories, such as Constructionism, Social constructivism, etc., and practical exercises for using theoretical underpinnings of these learning theories to create learning material with a purpose. To understand deeper this concept, several roles for trainees have been assigned, firstly like Problem-solver (PB) and Project Manager (PjM), which are perceived as difficult, highly theoretical as new concepts, secondly, while roles, such as Innovator (IN), Facilitator (FA), Developer (DEV) and Media Expert (MEX) usually are focused on practical subjects (Ferriman 2013). As video lecturing are integrated into their teaching in slightly different ways, lectures from recording to creating summaries of lectures or giving video feedback on group assignments is regarded as a really demanding task in a flipped class. It must be also of great interest to know whether (or not) course design can influence the

perceived usefulness in participating to a flipped classroom. Thence, this study is guided by the following two research questions (RQ):

1. *Can the flipped model be considered as a socially inclusive technology-supported instruction regarding its features for trainees who are different in terms of age, gender and web-based OER frequency level use?*
2. *Is there any difference regarding trainees' attitudes and perceptions related with their contemporary roles as instructional media designers, by following a flipped classroom instruction?*

This study is also stated to the assumption that trainee instructional media designers in Europe have different background, as some of them have different perspectives in utilizing web-based OER which are socio-economically and culturally and may influence the technological literacy advantaged more than those in the Greece (Toprak and Genc-Kumtepe 2014). Overall, in these circumstances, some trainees who frequently use less web-based OER and are also more likely to have not got previous experience and thence cannot accelerate easy their technological literacy. It should like to problematize this generalization of trainees. There is ample evidence available in the literature to suggest that a twenty-first century tertiary that is controversial, particularly in a society like the Greek one, where trainees are generally positioned, often highly differently in regard to socially, culturally and economically. To this notion, sometimes confusing or contradictory findings across the world based on the international literature are observed. It can be assumed, therefore, as important to explore trainee instructional designers' attitudes and perceptions by using a flipped instructional model for teaching and learning.

2 Background

Recent advances in technology and instructional science have entirely identified innovative directions for education research. The institutionalist pressure in increasing tuition costs and fees, online course offerings have opened a new discussion and catalyzing change in the traditional class instructional settings. The flipped classroom is an instructional-pedagogical model, which includes asynchronous video lectures and practice with homework, and active, group-based problem-solving activities in the classroom (Yu and Wang 2016) founded upon a constructivist theoretical lectures. Thence, two are of the most related movements that educational systems face in this era. The first is the innovative technological involvement. This involvement enables the amplification and duplication of information at an extremely low-cost statement. The second is the instructional-pedagogical. A notable option is "flipping" a class. It aims to best utilize technology outside the classroom and foster trainees turn into a problem-based learning workshop where they have an active role in understanding course concepts (Asef-Vaziri 2015). Especially, given the research expectations in many departments, instructors usually pay attention to invest the time and effort that are needed to dramatically change the conventional lecture-based teaching style.

To switch from this instructional method to one where active learning is used throughout a class, a very large investment of time is regarded. Many instructors stay with their current style of teaching simply because this is something regular and well-

known. Moreover, the uncertainty associated with trying a new approach may be a large enough obstacle to prevent a teaching style change. The most indicative potentials of the flipped classroom are that it can engage trainees in the learning process and the instructor has the opportunity to present and assist trainees in the application of the course content expression with his/her feedback, assisting to this notion self-regulated learning. These can easily be scaled so that even in large classes, trainee engagement to be increased (McLaughlin et al. 2014).

Using a flipped instructional model in various educational disciplines, previous studies have found positive learning outcomes in engaging learning tasks (Gilboy et al. 2015), improvement in conceptual understanding (Dove 2013), paradigm shift from teacher-centered to trainee-centered learning and enhancement in learning performance (Schultz et al. 2014). A majority of higher education institutions have utilized the flipped model in their courses and evaluated various efforts with the goal of increasing the quality of instruction (McLaughlin et al. 2014). The literature review of O'Flaherty and Phillips (2015) reports that many studies measuring trainees' performance were focused on comparisons to a traditional classroom with comparable exams that overlapped between the two instructional formats. Other studies provide evidence that "flipping" a classroom has a great potential to enhance learning performance in flipped classes, reporting the following outcomes and learning gains: (i) greater learning gains for trainees in the flipped model than those who participated with the traditional lecture-based model (Porcaro et al. 2016), (ii) greater degrees of learning achievement and motivation (Yu and Wang 2016), (iii) mixed results on learning outcomes (Mason et al. 2013), (iv) improvement on trainees' self-efficacy as well as their strategies of planning and using study time (Lai and Hwang 2016), and last but not least (vi) trainees' needs for competence, autonomy, and relatedness are at a large extent satisfying, which may result in greater levels of both intrinsic and extrinsic motivation (Abeysekera and Dawson 2015).

On the other side, the international literature has also pointed out several research gaps. For example, Sohrabi and Iraj (2016) have presented trainees' negative opinions expressed by using the flipped model. The reasons relate to trainees' different background and time spent to exploit other learning materials before attending to the class. Chen et al. (2015a, b) stress the need to conduct a study about the distinctive sets of opinions in the flipped statistics classroom, because there are learners with diverse needs and backgrounds in traditional classroom settings that should be underlined as factors affecting their participation in such courses. Al-Zahrani's (2015) study findings notice that using the flipped classroom, trainees several difficulties associated with the limited time preparation, because of not being all of them prepared to utilize adequate several web-based tools. Finally, Chen et al. (2015a, b) report that successful general concepts showing in trainees' feedback and their different gender using a flipped class are expected from the relationship between final grades and situational interest as well as course satisfaction.

3 Research methodology

The experiment took place during the Easter semester, in 2016. There was not any additional ethics approval required. The participants were recruited from each department about this exploratory study only voluntarily. An announcement regarding the study was sent to all trainees of both departments. All the participants attending to a

common course titled "*Instructional design and learning theories*" with the duration to be estimated in 6 weeks. A total number of twenty-six (n = 26) participants involved this study employed a mixed method research design (qualitative and quantitative data), using a survey distributed to all participants who involved in the study. Due to the relatively small number of participants, this study employed firstly a quantitative research design. A socio-demographic survey consists of four parts: demographic questions (gender, age), web-based OER use, experiences with use of flipped model, including perceptions on video lecturing and lastly a section for open ended comments.

Half percent of trainees were female (50%) and about half were over the age between 18 and 23 (50%). Trainees who have never or fairly many times used Web-based OER were comprised slightly less than a half of the sample (10% and 40%, respectively). Web-based OER level of frequency use was every time (50%). A large number of trainees thus fit at least two distinctive characteristics: age and web-based OER level of frequency use (see Table 1).

As it was mentioned above, this study set out to establish the potential of flipped method as an inclusive and technology-supported instructional model using OER. It was also explored whether the content of the course and how the learning materials were integrated into the course design determined the perceived usefulness and use of this method.

3.1 Data analysis

Quantitative data were analyzed using the statistical software package SPSS (version 24) by running frequencies and Pearson Chi-Square cross tabulations to test for significant differences ($p < 0.05$) based on trainees' demographic data (gender, age and web-based OER level of frequency use) and by the main lecturer (researcher). Test-statistic x^2, degrees of freedom (df) and p-values were reported, if they showed significant differences. All trainees gave informed consent to take part in this study.

Table 1 Demographics

	N	%
Gender		
Female	13	50
Male	13	50
Total	26	100
Age (years old)		
18–23	13	50
24–26	10	40
27–30	3	10
Total	26	100
Web-based OER level of frequency use		
Never	3	10
Considerably many time	10	40
Every time	13	50
Total	26	100

N number of items, *M* Mean, *SD* Standard Deviation

The data were reported anonymously in order to ensure confidentiality. In addition, following the approach of qualitative data analysis outlined by Shields and Rangarjan (2013), it was more appropriate to the open-ended comments to be searched and organized correctly around emergent themes of all trainees with the view to be used to make sense of the results from the quantitative data.

Investigating the qualitative data, survey items and open-ended questions were analyzed at the same time to advocate the results. This mixed method study gives an emphasis on diversity at all levels of the research. This diversity on results can pioneer to comprehensive investigation of the phenomenon (Creswell et al. 2011). Open-ended questions were analyzed thematically. Responses to these questions were coded and to support the findings, original expressions of participants were listed. The data were collected, firstly by using an interview with an open-ended questionnaire to encode trainees' experience in focus groups. The trainees' answers were conducted in order to be checked the collected data and thence all questions were based on specific criteria: (a) the trainees' overall experience and evaluation of all sub-units of these lectures, (b) the assessment of trainees' achievements in learning goals and (c) the estimation of trainees' abilities and difficulties, when studying collaboratively with their peers. Focus groups were also supported this study's results for the following reasons: (a) the purpose of this research method was to generate trainees' ideas in more concede settings. The researcher's role was to moderate the conversation of each group, (b) each group was also separated with 4–6 trainees who had different roles and each one of them called by interpersonal note cards, (c) all trainees who attended in the interview were sitting near to the instructor-researcher and shared their ideas, opinions and perspectives and (d) the focus group discussions encouraged trainees to collectively afford even a common opinion about their actions. This process may have a risk, because some trainees may not have the time to express opinions freely.

4 Results

This paper explores the potentials of flipped classroom as a "*technologically inclusive*" context-aware instructional model that not exclude any trainees with different gender, age or socio-economic background linked for the purpose of this study to the trainees' previous experience in web-based OER. This perspective is impactive to be looked at whether trainees' demographics had an impact on web-based OER level of frequency use in flipped class instruction, as the first question need to be answered.

> *RQ 1: Can the flipped model be considered as a technology-supported instruction regarding its features for trainees who are different in terms of age, gender and web-based OER frequency level use?*

From the 26 participants, approximately 64% accessed and watched to the videos made available to them (see Table 2). Although there are statistically significant differences around the use of trainees' correspondence in flipped classroom and demographics, these differences are not the expected ones. There is, e.g., no statistically significant difference in participating in a flipped class, in terms of gender ($x^2 = 0.223$, df = 1 and p-value >0.05). There is a significant difference in terms of age though

Table 2 Statistical analysis about the use of video-recorded lectures for identifying differences between groups (*p*-values from the Chi-Square test)

	Total			Web-based OER level of frequency use						*p*-value		Gender				*p*-value		Age						*p*-value
				Occasionally		Fairly many times		Always				Female		Male				18–23		24–26		27–29		
Use of videos in flipped model																								
	n	%		n	%	n	%	n	%			n	%	n	%			n	%	n	%	n	%	
Yes	17	74%	Yes	6	74%	7	70%	4	61%	0.225	Yes	8	64%	7	45%	0.614	Yes	9	80%	5	75%	4	55%	0.032*
No	9	26%	No	4	26%	3	30%	2	39%		No	5	36%	8	55%		No	2	20%	3	25%	3	45%	
Total	26			10	100%	10	100%	6	100%			13		13				11		8		7		
How many of the videos have you watched to?																								
One	5	25%		1	5%	3	30%	1	25%	0.001*		3	15%	4	25%	0.242		3	25%	1	10%	2	35%	<0.001*
A few	9	30%		4	45%	4	40%	1	25%			5	50%	5	55%			3	25%	2	20%	1	5%	
About half	3	15%		1	5%	1	10%	1	25%			3	15%	1	5%			0	0%	2	20%	0	0%	
Most	5	25%		3	35%	1	10%	1	25%			1	10%	2	10%			1	10%	2	20%	1	10%	
All	6	20%		2	10%	1	10%	2	50%			2	20%	1	5%			4	40%	2	20%	3	55%	
Total	26	100%		10	100%	10	100%	6	100%			13		13				11		8		7		
On average who often do you watch to a video?																								
Once	5	25%		2	20%	4	40%	1	20%	0.001*		6	55%	5	45%	0.847		6	60%	3	55%	4	60%	0.004*
Twice	9	20%		3	30%	3	30%	1	20%			3	25%	4	35%			2	15%	2	20%	2	30%	
Three times	3	10%		1	10%	2	20%	1	20%			2	10%	1	10%			2	15%	1	10%	1	10%	
More than three	11	45%		4	40%	1	10%	3	40%			2	10%	2	20%			1	10%	2	20%	0	0%	
Total	26			10		10		6				13		13				11		8		7		

*Significant difference (*p*-value <0.05)

(x^2 = 5.116, df = 2 and p-value <0.05). Flipped was used mostly by the 24–26 age group, followed by the 30–31 age group. Most importantly, there is no significant difference in video watching (x^2 = 3.564, df = 2 and p-value >0.05), although trainees who previously may be engaged slightly were less than other counterparts.

However, when asked about the level of engagement and the amount of times trainees viewed to class-recorded videos, these numbers was changed. Slightly more than half of the trainees who accessed class-recorded videos watched more than half of the videos which made by them (74%). Almost 26% of the trainees, who followed the use of videos, watched to most or all of them. To this notion, there is no difference in gender, but there are statistically significant differences in terms of age (x^2 = 31.731, df = 8 and p-value <0.001) and gender (x^2 = 17.340, df = 8 and p-value <0.001). Males and females in younger ages with average web-based OER level of frequently use was mostly engaged in flipped class, with around 71% of the trainees who had engaged with previous OER use to most/most/all the videos. Only around 29% of males speaking trainees watched to most/all of the videos. The data analysis also showed that older trainees showed more engagement with video lecturing. More than 74% of trainees aged 24–26 watched to most/most/all the videos, as opposed to only 26%.

On the one side, of all the trainees who watched the videos, 20% watched to each video on average, three times or more. A similar observation to the findings above can be established as no significant difference in gender can be seen, but gender and age seemed to play a significant role. More than 60% of male trainees watched the videos three times or more (x^2 = 25.083, df = 5 and p-value <0.05) and older trainees watched significantly more than younger colleagues (78%, x^2 = 19.734, df = 6 and p-value < 0.05). It is also notable to mention the choice of device that trainees used to watch to videos. While "flipping" class using videos is usually seen through smart phones that allow one to watch lecture videos anywhere, anytime, trainees of this study challenged this definition. More than a half of trainees (55%) reported using personal computers to watch videos and 35% relied mainly on the computers in the on-campus computer labs (see Table 3). Only 20% reported using their smart phones or other tablets. There are significant differences with significantly more web-based OER level of frequently use by trainees using the computers in the labs than those with little web-based OER level of frequently use colleagues (p-value < 0.05) and significantly other trainees using their smartphones (p-value < 0.05). Male watchers access videos significantly more on than off campus (p-value < 0.05).

On the other side, the international literature has also pointed out several negative qualities. A criticism for a flipped model is about watching uploaded videos is still more like a traditional teaching (Nielsen 2012). Johnson et al. (2014) refer that beyond watching videos, some other technologies should be integrated with flipped classrooms for the improvement as an instructional model. Also, instructors of these studies stated that some trainees, who are new to this approach, can be resistant because of their different background in traditional learning approaches. Moreover, the materials for the flipped classroom should be in good quality and they should match based on trainees' level. Preparing a good quality video can be very time consuming for instructors and some of them may not have the appropriate experience with technology to manage their instructional material. As a result, the preparation time compared to the typical instructional model for both teachers and trainees is still required (Sahin et al. 2015). Recent literature reviews (DeLozier and Rhodes 2016; O'Flaherty and Phillips 2015) take into

Table 3 Statistical analysis of trainees' access to videos for identifying differences between groups (*p*-values form the Chi Square test)

	Total		Web-based OER level of frequency use						*p*-value	Gender				*p*-value	Age						*p*-value
			Sometimes		Considerably many times		Every time			Female		Male			18–23		24–26		27–29		
Where do you access videos from?																					
On campus	12	45%	3	45%	4	40%	5	60%	<0.001*	6	55%	6	55%	0.036*	4	40%	4	40%	1	10%	0.019*
Off campus	9	35%	2	35%	4	40%	3	30%		4	35%	4	35%		5	50%	5	50%	4	80%	
Both	5	20%	1	20%	2	20%	2	10%		3	10%	3	10%		1	10%	1	10%	1	10%	
Total	20		6		10		10			13		13			10		10		6		
What device did you use to watch to videos?																					
Personal computer	14	55%	3	60%	6	60%	5	50%	0.035*												
Computer laboratory	7	35%	1	10%	3	24%	3	40%	0.031*												
Smart phone/Tablet	5	20%	2	30%	1	16%	2	10%	0.002*												
Total	26		10		10		10														
When did you watch to videos?																					
Everyday	8	35%	3	30%	3	30%	2	25%	0.556*	5	40%	5	40%	0.033*	3	30%	3	30%	2	25%	0.899*
Weekend	6	15%	2	20%	2	20%	2	25%		5	40%	5	40%		3	30%	3	30%	2	25%	
Before exam	8	35%	3	30%	3	30%	2	25%		2	15%	2	15%		3	30%	3	30%	2	25%	
Not watching	6	15%	2	20%	2	20%	2	25%		1	5%	1	5%		1	10%	1	10%	2	25%	
Total	26		10		10		6			13		13			10		10		6		
What did you do while watching to videos? (multiple answers possible)																					
Take notes	13	60%	5	50%	5	50%	3	50%	0.03*												
Copy notes	8	30%	3	30%	3	30%	2	30%	0.067												
Only watch	3	10%	1	10%	1	10%	1	20%	0.028*												
Total	26		10		10		6														

*Significant difference (*p*-value <0.05)

under serious consideration the benefits and drawbacks, identifying that switch from a traditional to a flipped classroom can be frustrating, because of the lack of accessible and effective models for accomplishing it.

However, this study showed that while some trainees used the videos before exam time (35%), a larger number watched to the available videos on a regular basis during the course of the semester (35%), while 15% showed not watching anything (see Table 3). There are no significant differences in terms of age or OER frequency use, although male trainees seem to listen more regularly during the semester than female trainees ($x^2 = 9.320$, df = 3 and p-value < 0.05).

Another concern based on literature is if video lecturing can make trainees passive recipients of teacher's instructions. For instance, Nielsen (2012) found that watching to videos do not necessarily improve trainee learning outcomes, but rather that taking notes, a term which they coined fostering deeply learning in some appropriately structured tasks under well-designed instructional guide. Trainees indicated that they were active while watching to the videos. 60% of trainees reported taking notes and 20% only copying notes of various sections of the modules referred to in the recordings (see Table 3). Only 10% of trainees watched to the video recordings without engaging in other study-related activities.

RQ 2: Is there any difference regarding trainees' attitudes and perceptions related with their contemporary roles as instructional media designers, by following a flipped classroom instruction?

This study was also interested as to whether trainees' use of flipped model was in any way influenced by the course content and design. The main instructor who involved in this study teach both theoretical and practical tasks, which are perceived by trainees differently in terms of difficulty. In particular, Problem-solver (PB) and Project Manager (PjM) are perceived as difficult, highly theoretical in which trainees should introduce new concepts to trainees, while roles such as Innovator (IN), Facilitator (FA), Developer (DEV) and Media Expert (MEX) are focused on practical subjects. All trainees were assigned randomly for their roles as their socio-cognitive background was generally at the same level.

While four of the trainees (PjM and DEV, PB, MEX) offered straightforward recordings of their lectures to trainees with varied degrees of editing involved, the IN instructor provided introductions and summaries to specific topics and the FA lecturer provided feedback on group assignments (see Table 4). The main instructor (author) took part in this project, with his lectures covering a wide range of courses in which as the main instructor of this project tried to teach what skills should a contemporary instructional media designer have so that respond efficiently in today's challenges.

Without doubt then, the specific nature of the course emerged as a strong factor which influenced the level of trainee perceptions for video courses ($x^2 = 3.306$, df = 2 and p-value <0.001, see Table 5). The trainees with MEX roles found regular course recordings particularly useful (90% of trainees with this role seemed to be engaged with videos, 25% of the trainees who engaged with videos watched to most/all her videos and 25% watched three times or more to each video).

In comparison, significantly fewer of the DEV trainees had video watching (50% of trainees watched to videos, and of those only 25% watched to most or most/all the

Table 4 Use of and access to video in different courses

Courses about the roles and competences of the contemporary instructional designer	Abbreviations	Content of video-recorded courses (adapted by Ferriman 2013)	Length of videos in total (minutes)	Accessibility
Innovator	IN	An instructional media designer should try to learn how to use web-based tools and transactions to schools or universities where traditionally many students strive to appropriate use effectively these tools.	60–70	Moodle
Facilitator	FA	An instructional designer should assist students to be exposed to the learning material, using ICT tools in order to "learn-by-doing".	85	Moodle
Problem Solver	PB	An instructional media designer should know how not only to create, but also to solve problems to be when creating training exercises, using different e-learning systems, live streaming devices or LMS even if for delivering these "types" of instructional format, s/-he has limited timelines or small budget.	90–100	Moodle
Developer	DEV	An instructional media designer should know really well how to use web-based transactions in order to start creating course development content for example in LMS.	60–70	Moodle / Using smartphones/ trainees' own recordings
Project Manager	PjM	An instructional media designer having larger training implementation, s/he need to manage carefully a specific budget with specific as well time limits depending on team's population who worked on a specific project, i.e. writing curriculum for a specific learning domain.	60–70	Moodle / Using smartphones/ trainees' own recordings
Media Expert	MEX	An instructional media designer in this contemporary era should have the opportunity to make exercises using a variety of digital tools, like online videos, software, image selection and creation.	50–60	Moodle

Table 5 Statistical analysis about the use of video lecturing for identifying differences between groups (*p*-values from the Chi-Square test)

	Course												
	PB		PjM		IN		FA		DEV		MEX		*p*-value
Use of flipped instructional tool set using web-based OER													
	n	%	n	%	n	%	n	%	n	%	n	%	<0001*
Yes	2	50%	3	80%	4	80%	3	90%	1	10%	3	90%	
No	2	50%	1	20%	2	20%	1	10%	3	90%	1	10%	
Total	4		4		6		4		4		4		
How many of the videos have you seen?													
One	2	50%	0	0%	2	20%	0	0%	0	0%	0	0%	<0.001*
A few	1	25%	1	10%	2	20%	1	25%	2	50%	2	50%	
About half	0	0%	1	10%	2	20%	1	25%	1	25%	1	25%	
Most	1	25%	4	80%	2	20%	1	25%	1	25%	1	25%	
All		0%	0	0%	2	20%	1	25%	0	0%	0	0%	
Total	4		4		6		4		4		4	100%	
How often do you watch to a specific class video?													
Once	1	10%	1	25%	2	25%	1	25%	1	25%	1	25%	<0.001*
Twice	0	0%	1	25%	2	25%	1	25%	1	25%	1	25%	
Three times	0	0%	1	25%	2	25%	1	25%	2	50%	1	25%	
More than three	3	90%	1	25%	2	25%	1	25%	0	0%	1	25%	
Total	4		4		6		4		4		4		

*Significant difference (*p*-value <0.05)

videos and only 25% watched to videos three times or more). The reasons for the different use of videos across courses could be related to trainee demographics. There are significant differences across courses in terms of gender ($x^2 = 51.691$, df = 5 and *p*-value <0.001), age ($x^2 = 61.234$, df = 10 and *p*-value <0.001) and web-based OER frequency use ($x^2 = 32.443$, df = 8 and *p*-value <0.001, see Table 6). It was tried also to be balanced the sample female/male for all roles.

Nevertheless, as it was mentioned before, PjM was also a difficult course, theory heavy, full of new theoretical concepts and new terminology, while FA is a less cognitively demanding subject (the study of literature), where trainees may not feel the need to be engaged with videos as urgently in other subjects, and specifically as their counterparts who were engaged actively and repeatedly with the content. In similar demands and in practice-based learning tasks relying heavily on visuals, audio-based video lecturing, trainees seemed to take less instruction than others.

As it was mentioned earlier, focus groups have been used for the following reasons: (a) their purpose generates trainees' ideas in more concede settings. Dialogues were registered via a digital voice recorder, because all interviews were conducted in face-to-face settings, written out in digital or hard copy documents. The scheme proposed a classification of dialogues enacting into different functional levels of flipped instructional model in using web-based OER (see Table 2). The analysis of the qualitative data was made via Nvivo (ver. 10) collection tool, as it should be aggregated all digital documents, putting all of them in a common basis and finally the main results from the interview extracted. Results are described below.

Table 6 Statistical analysis of trainees' demographics by course for identifying differences between groups (*p*-values from the Chi-Square test)

	Course												
	DEV		FA		IN		PB		PjM		MEX		*p*-value
Gender													
Male	2	50%	2	50%	3	50%	2	50%	2	50%	2	50%	<0.001*
Female	2	50%	2	50%	3	50%	2	50%	2	50%	2	50%	
Total	4		4		6		4		4		4		
Age													
18–23	2	50%	1	25%	2	30%	76	49%	41	87%	2	50%	<0.001*
24–26	1	25%	2	50%	1	10%	50	33%	5	11%	1	25%	
27–30	1	25%	1	25%	3	60%	28	18%	1	2%	1	25%	
Total	4		4		6		4		4		4		
Web-based OER level of frequency use													
Sometimes	2	50%	2	50%	4	80%	2	50%	1	20%	2	50%	<0.001*
Considerably many times	2	50%	2	50%	2	20%	2	50%	3	80%	2	50%	
Every time													
Total	4		4		6		4		4		4		

*Significant difference (*p*-value <0.05)

By analyzing the open commentary in the questionnaire, it was supported the opinion for all the aforementioned claims. The following are some of the comments from both of these courses which exemplify these emerging themes:

- "*Many times, I have tried to stop the instructor in order to summarize any optional information for knowledge gain; however, it was not so ease and ask him to repeat something by raising my hand. By watching video lectures, I could stop, pause, or rewind, anytime I wanted to from other web-based transactions (DEV, female)*".
- "*I could access videos at any time, if the lecture went too quick and the instructor could not speak loudly enough to hear when I was sit far away from him. The fact that it feels like I am in class again using web-based OER transactions was really great (PB, male)*".
- "*Videos may not become so successful or might not motivate me if I do not have the chance to come to class and inside my home, I had the opportunity to use digital tools, Internet and other video resources to watch and study my lesson. (MEX, female)*".
- "*It would be great to have video videos, whereby one is also able to see the lecture teach especially when the lecture makes use of the board and explains (PjM, male).*"

The survey was used to identify the perceptions of trainees regarding the methodologies in the teaching-learning process. In specific, trainees were asked to remark on their desired homework frequency per week (sometimes, considerably many times, every time). The flipped class gave a higher rating score (M = 4.35 and M = 4.45) than

the traditional class (M = 2.24 and 2.84) to the statements "*I could not complete my homework because a simple question caught in my mind was blocking my progress*" and "*I could not complete my homework, because I could not ask anyone when I needed help on the homework*". In addition, trainees could implement their general opinions about the teaching and learning process in open-ended questions. The trainees had controversial responses. Some of them enjoyed studying courses via this concept, and it motivated them to study. For instance: "*In class activities, I could easily ask my classmates and the instructor questions, and this made me feel relaxed and happy. I liked studying activities and solving problems in groups*".

Some trainees suggested that they needed to spend more time on studying for the course. Otherwise, it was difficult follow the topics in the course hour. Therefore, meaningful learning occurred, resulting in improved grades. They watched online lessons and solved homework during class time to support their learning. This encouraged them to study more than they had expected. For instance: "*I like the way of learning by watching videos, because I came to class ready after watching related topics, and then, I was easily adaptable on what the instructor taught and solved related problems during the in-class activities*".

> "*Despite I spent much time studying than before, I enjoyed it, because I could take notes easier at the time I wanted it. Watching videos, pausing and taking notes increased my interaction with the course. As much as I tried, I feel that I could do difficult concepts in this manner*".

However, one concern was that sometimes some trainees did not get used to studying in pre-class activities: "*When I got used to it, it was easy to follow and I was not so anxious about how can I top someone speaking. When I did not watch the video before coming to class, it was at first difficult to solve and participate in problem-solving activities. When I needed help from the instructor, it was impossible to conclude the entire topic just for answering my question. However, sometimes I could ask my classmate and get feedback from them. I did not like watching at home. I think that lecture should be done in class. The instructor explains, and I take notes. If there is a problem, one can ask at any time. An added value for video lectures…*".

An interesting response discussed the class size and lecture format: "*Sometimes the classroom is very crowded. The instructor tried to figure out this situation and give feedback to all my peers. However, sometimes there were too many people that he need to assist in order to be finished the projects*".

5 Discussion and conclusion

The purpose of this paper was to answer the questions set out in this exploratory study, which asked if video lecturing could be considered as a socially inclusive technology, corresponding on how flipped practices accessed and used by differently positioned trainee instructional media designers determining as well if there are any differences in levels of engagement based on their specific roles. It was showed that trainees spent extensive time on the content presented in the videos, through repeated watching to the videos, which were made available.

Flipped seemed to be a technology-supported instructional method and it has reached maturity for use to many educational disciplines and contexts. "Flipping" a class is seen as a useful tool to help trainees revise and deepen their content knowledge. While previous studies in using flipped often yield contradictory results in terms of trainees' uptake and perceptions of the value and usefulness of video lecturing. To this respect, trainees are not passive receivers in a lecture-based learning approach, and as a method can enhance learning gain. This instructional approach can be defined "*technologically inclusive*" context-aware instructional model, as it is not excluding any trainees based on gender, age or level of web-based OER use. This study was particularly interested in the perceptions of video lecturing, web-based OER level of frequently use for trainees who comprise some of the most vulnerable access in different technologies for teaching and learning and who fit to the profile of what instructional media designers may face in their professional life.

The results of this study are not challenged the findings of other studies which found that video lecturing in general is not necessarily taken up by a majority of trainees (DeLozier and Rhodes 2016). This study's findings indicate research has found that videos were used extensively. No significant difference can be seen in the use of video lecturing in terms of gender or the age of trainees. Furthermore, it should be noticed that the course content and the manner, in which video lecturing have impacted strongly on trainees' perceptions of its usefulness and consequently on their level of engagement. As one of the factors contributing to the level of engagement is inevitably the regular videos use with content-heavy lectures that attracted trainee participation and engagement. This comes contrary to previous findings of the literature (Nielsen 2012), which claim that video lecturing may have shortcomings in providing complex and/or detailed information that needs to be heavily processed, logically deconstructed, committed to memory and/or great deal of concentration (DeLozier and Rhodes 2016). Although the majority of trainees perceived videos as useful for the revision of content, some others were interacted regularly with video lecturing during the course of the semester. Although this study did not focus on the development of self-regulatory skills through the use of video lecturing, it has been noticed that certain deeper learning activities related to self-regulated learning and strategic planning for learning (i.e., note taking) are important to the success attributed to video lecturing by the trainees in this study. Additionally, the results agreed with Ferreri and O'Connor (2013) findings that flipped was particularly useful in developing cognitive thinking skills, such as problem-solving, who may struggle to understand content or who are too shy to ask questions in class.

The present study has shown that trainees continue to be positioned differently in terms of economic, social and cultural factors (Hung 2014) that can be directly linked to their web-based OER frequency. It was also found that this did not have an impact on their ability to access the technology that was necessary for knowledge acquisition. In contrast to other studies (Martin et al. 2013; McLaughlin et al. 2014), trainees are resourceful in finding complex and nuanced ways to be engaged with technologies within broader structural learning conditions. The results, however, showed that not all trainees can rely on their own mobile phones to access videos and that the institutional provision of computer laboratories might still be an important aspect in terms of providing an equitable access to technology for all.

In conclusion, this study's findings also reinforce the notion that video lecturing can lead to deeper learning. The majority of trainees reported who were actively involved in the learning process while watched to videos by taking notes, they seemed to be concentrated on the task at hand. This is contrary to the common belief that videos lead to passive learning. It would be argued that note taking allow the development of cognitive strategies synonymous with self-regulated learning in flipped classroom (Butts 2014). With such a self-regulated process, trainees are able to transform their mental abilities into academic and problem-solving skills and other studies (for example Jamaludin and Osman 2014) have found that learners systematically engaged to utilize metacognitive, motivational and behavioral strategies to proactively seek out information and gradually master it.

6 Limitations and future work

Some of the most notable limitations that should be considered based on this study's findings are as follows:

(a) The small sample size of trainees who participated voluntarily (n = 26).
(b) Trainees' characteristics may differ from other universities, and the results of this study cannot be generalized, because this study sample was only from Greece.
(c) The subject availability was limited to three months and trainees have to devote their time on university-level courses or other workshops.
(d) The current study was deployed using asynchronous communication tools, such as Moodle forums or email, since the main instructors wanted to stay in conduct with all trainees so as to provide the appropriate feedback and support in sufficient time and almost daily.

As it has been discussed before, it was difficult to define exactly whether trainees' demographics or course design influencing their engagement with following flipped instruction. What it would, however, seem to be crucial is that if video lecturing is integrated effectively into the course curriculum, all trainees who were the focus on this study can more properly be engaged. The findings also confirmed the complex nature of emerging technologies, highlighting the results that in part contradict the international literature and call for an approach to integrating technologies that is sensitive to specific needs, challenges and resources of trainees in Greece. Additionally, trainees' perceptions in new technologies cannot be prejudged, based on research carried out elsewhere or taking under serious consideration only their socio-cognitive background. This study emphasizes to the importance of conducting local context-specific research, when trying to respond to local problems and issues. It must be noted that further research is also required in order to include lecturers' perceptions more extensively.

Compliance with ethical standards

Conflict of interest The author declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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