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The Impact of Digital Citizenship Instruction through Flipped Classroom Model on Various Variables

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Abstract

With the advent of portable technological devices such as mobile phones and tablets, online learning environments have become widespread at schools. This, in turn, has resulted in the emergence of a new learning environment: flipped classrooms. The flipped classroom could be defined as a modern learning environment where teaching content is presented to students through online sources outside the school. The present study examined the impact of digital citizenship instruction through the flipped classroom model on various variables such as learning performance, self-regulated learning, self-directed learning, and information literacy. The study employed a quasi-experimental research design in which pre-tests and post-tests were applied to both research and control groups. The participants were 59 teacher candidates who were freshman undergraduates at Bozok University. During a five-week implementation process, research group students performed certain activities related to digital citizenship while the control group learned digital citizenship via traditional methods. The results showed that the flipped classroom model had a significant effect on only learning performance. No difference were observed between research and control groups in terms of self-regulated learning, self-directed learning, and information literacy variables.

Keywords: *Digital citizenship; Flipped classroom; Learning performance; Self-regulated learning; Self-directed learning; Information literacy*

Introduction

Technology, which could be defined as the use of science with practical devices, has been improving with an immense pace in recent years. The increase in the number of people who deal with scientific studies and practical applications have resulted in a major advancement in technological applications. Since adapting to this new world order is the key to maintain their existence, nations and communities pay a great attention to the use of technological advances. These rapid changes have also influenced our daily life, and a new concept, called digital citizenship, has emerged.

Digital citizenship is a new term for practices that aim to enable teachers, technology leaders, parents, and children/students to use technology appropriately. Basically, it is the norms of proper, responsible technology use, which help create a society that is well-acquainted with technology (Ribble, 2017). In order to know of both negative and positive sides of using

technology extensively in our daily life, to benefit from its advantages at a maximum level, and to avoid its dangers, all individuals in the society need, at least, a basic level of digital citizenship instruction. Therefore, being a digital citizenship requires having certain affective behaviors. In general, a digital citizenship instruction comprises of nine headings: a) Digital literacy, b) Digital access, c) Digital communication, d) Digital trade/shopping, e) Digital ethics, f) Digital responsibility and rights, g) Digital health, h) Digital law, and i) Digital security.

With these topics taught at a digital citizenship instruction, it is aimed that individuals gain cognitive, affective and psychomotor behaviors. People need to show more effort to obtain such affective and psychomotor behaviors when compared to cognitive ones. Therefore, a more effective learning method or strategy is essential. In this context, it is crucial that students should have a learning environment where they can manage their own learning process, choose topics related to their needs, apply what they have learned in appropriate time, reinforce their learning outcomes, and finally gain more complex behaviors.

This study has been conducted with the assumption that the flipped classroom model as a learning method in which the learners can learn by themselves at their spare or suitable time (out of school time), and in-school can be effective in teaching digital citizenship as well as improving learning through practices which have high social interaction with peers and teachers. The research also investigated the impact of flipped classroom on various variables such as students' self-regulated learning, self-directed learning and information literacy skills which are considered to be effective in content-teaching processes.

What is the Flipped Classroom Model?

In recent years, there has been a new trend towards a student-centered learning in learning environments. In many research studies on effective and fruitful learning methods, we often see a new term called 'flipped classroom' (Thai, De Wever, & Valcke, 2017; Wang, 2017; Zhai, Gu, Liu, Liang, & Tsai, 2017). Particularly, since it backs up active learning processes, the flipped classroom model has been a common trend in higher education (Brooks, 2014; Porcaro, Jackson, McLaughlin, & O'Malley, 2016). The flipped classroom model is a learning method which enables students to learn subject matters before coming to the classroom, and apply these learning experiences in the classroom (Long, Cummins, & Waugh, 2017). This model is identified to be a special kind of blended learning which provide students with web-based lessons before they come to classroom environment (Graham, McLean, Read, Suchet-Pearson, & Viner, 2017; Thai et al., 2017). The basic feature of a flipped classroom model is to present teaching contents to students with videos or online materials outside the classroom (Sun, Wu, & Lee, 2017; Yilmaz, 2017). In this model, the role of a teacher is to observe students and guide them with help throughout the process (Kong, 2015). According to Aidinopoulou and Sampson (2017), the flipped classroom model supports active learning processes. Similarly, it is claimed that learning should not be restricted with classroom environment and that students should benefit from digital sources in accordance with their own learning speed (Davies, Dean, & Ball, 2013; Kim, Kim, Khera, & Getman, 2014).

The Impact of Flipped Classroom Model on Learning Performance

There are studies which show that the flipped classroom model, enriched with digital sources, has a positive impact on learning performance (Wang, 2016). However, Turan and Goktas (2016)

point out that the number and extent of studies about the flipped classroom model is not sufficient enough to draw meaningful conclusions. For example, the study results conducted by Baepler, Walker, and Driessen (2014), Chao et al. (2015), Bhagat, Chang, and Chang (2016), Olakanmi (2017), Turan and Goktas, (2016), Zhonggen and Guifang (2016) show that flipped classroom increases the learning performance of students. On the contrary, many studies have found that the flipped classroom has no impact on learning performance (Davies et al., 2013; Findlay-Thompson & Mombourquette, 2014; Overmyer, 2014). As evidenced by these studies, there are conflicting results about the effect of flipped classroom on learning performance (Yılmaz & Baydas, 2017). Thus, more studies about the flipped classroom are needed.

Self-Regulated Learning

Even though the flipped classroom has recently become popular, students still lack the ability to regulate their own learning processes outside the classroom (Lai & Hwang, 2016). Therefore, self-regulated learning has got a great importance to control learning processes in the flipped classroom model (Yilmaz & Baydas, 2017). Self-regulated learning could be defined as the process that helps students manage their emotions, thoughts, and behaviors so they could create their own experiences successfully (Zumbrunn, Tadlock, & Roberts, 2011). Self-regulated learning has mainly four components (Cascallar, Boekaerts, & Costigan, 2006; Pintrich, 1995; Zimmerman, 1989). These are:

- Effective structuring: To create personal meanings, values, goals, and strategies with the knowledge that individuals gain from both internal psychology and external physical and social environments
- Control potential: To monitor, control and regulate processes related to learners' cognition, motivation, behavior, and environment
- Awareness of objective, measure, and standards: To realize of various processes that help learners determine where to stop, proceed or make changes while managing their own learning experiences
- The social and conceptual dimension of learning: To know of certain variables such as learners' cultural, demographical, and personal features which impact on learning, and to be able to use them when necessary

Although self-regulated learning has a critical role in the flipped classroom, there are limited studies that examine the effect of flipped classroom on self-regulated learning. As one of these limited studies, Sun et al. (2017) investigated the effect of flipped classroom and distance learning models on self-regulated learning processes of undergraduate students. The findings revealed that there is no difference between groups in terms of self-regulated learning. In another quasi-experimental study, Lai and Hwang (2016) examined the impact of flipped classroom model designed within the framework of self-regulated learning. The results of the study demonstrated that there is a meaningful difference between research and control groups. These studies suggest that the flipped classroom has a significant effect on self-regulated learning but it is hard to draw a general meaningful conclusions from the few studies.

Self-Directed Learning

Self-directed learning could be simply defined to be a model that enables students to be responsible for their own learning experiences and manage them. In this model, students should

have the ability to set their learning goals, determine their learning sources and choose correct learning strategies (Knowles, 1975 cited by Karatas, 2016). Self-directed learning is regarded to be one of the basic skills that one needs to maintain throughout the life-long learning process (Foo & Hussain, 2010). There are limited studies that show the flipped classroom model supports students' self-directed learning skills. For example, Kim et al. (2014) investigated the smart-based flipped learning activities on students' self-directed learning skills. The quasi-experimental study compared three instructional methods including the smart-based flipped learning, normal flipped learning and traditional methods. Students in the smart-based flipped classroom searched data, used applications and conducted online evaluations while students in the normal flipped classroom discussed topics and shared knowledge among themselves in the classroom. It was found that smart-based flipped learning has improved students' self-directed learning ability more than the normal flipped learning and traditional learning methods. Another study conducted by Alsancak-Sirakaya and Ozdemir (2018) compared flipped classroom and classical blended learning on students' self-directed learning readiness. According to the results of the study, no difference was found between the research and control groups in terms of self-directed learning readiness.

Information Literacy

Information literacy comprises of a range of skills including finding information, analyzing it, and using it when necessary (Ranaweera, 2008). It is now considered to be one of the 21st-century skills that one needs to have. Therefore, it is crucial that individuals possess information literacy competency. One of the effective models that can be used in gaining information literacy skills is the flipped classroom. A pre-research study involving secondary school students illustrated that the students have a significant growth in information literacy competency through the flipped classroom model (Kong, 2014). This study suggests that the flipped classroom model can enhance students' information literacy skills.

Method

In this study, we employed a quasi-research design in which pre-tests and post-tests are applied to both research and control groups. The first aim of the study is to investigate the impact of digital citizenship instruction through flipped classroom on learning performance. It is also investigated that the impact of flipped classroom on various variables such as students' self-regulated learning, self-directed learning and information literacy skills. In this context, we tried to address the following research questions:

- Is there a difference between research and control groups with regards to students' learning performance?
- Is there a difference between research and control groups with regards to self-regulated learning?
- Is there a difference between research and control groups with regards to self-directed learning?
- Is there a difference between research and control groups with regards to information literacy?

Subjects

This study employed a convenience sampling method. Participants of this study are 1st-year (freshman) undergraduates (*N*=59) who are enrolled at departments of Social Sciences Education and Pre-School Education at Bozok University which is located in a neighborhood with low socioeconomic status. Many participants did not have personal computers and Internet access. None of them had a flipped classroom experience before taking part in this study. The distribution of participants by gender and department is presented in Table 1.

Table 1. The Distribution of Participants by Gender and Department

Department	Female	Male	Total
Social sciences education (Research)	22	4	26
Pre-school education (Control)	26	7	33
Total	48	11	59

Research Phases

The implementation phase of the research took place in an undergraduate course called 'Computer II'. During this stage, research group students are taught digital citizenship subjects by flipped classroom model while control group students are taught them with traditional methods. For a duration of 5 weeks, each group took a 2-hour course. Before beginning these courses, the researchers prepared PowerPoint presentations in electronic format. These presentations were titled as 'Basic Concepts and Definitions of Digital Citizenship', 'Dimensions of Digital Citizenship', 'The Necessity for Digital Citizenship', and 'Digital Citizenship within the Family and Institutions'. Moreover, certain activities related to these teaching contents were planned for the research group students. The teaching contents prepared in electronic format were shared with students via researchers' blog. They were asked to study them before coming to the class. Students also did a comprehensive research about activities planned on a weekly basis. They filled in a report by using Google Documents. Then, students discussed related subjects in the classroom. For the control group, students took lessons through PowerPoint presentations including the same content in a lecture format (expository approach). They asked questions and discussed on related subjects. Both groups received the same syllabus but the research group students were asked to study the topics outside school time and in-lessons exercises were conducted instead of the lectures. A detailed summary of the research phase is presented in Table 2 below.

Table 2. Research Phase

<table>
<tr><td colspan="2">A Pre Achievement Test (digital citizenship), Pre-Test (self-regulation, self-directed learning, information literacy)</td></tr>
<tr><td colspan="2">Introducing Syllabus and Learning Goals</td></tr>
<tr><td>Flipped classroom exercises</td><td>Syllabus for both groups</td></tr>
<tr><td>● Discussing the concept of 'ethics'
● Doing a research on laws about cybercrime
● Methods of determining a secure password
● Exploring e-state services</td><td>● Basic Concepts and Definitions of Digital Citizenship
● Digital Citizenship's Dimensions</td></tr>
</table>

● Creating sample scenarios about the negative impacts of TV, internet, mobile phones and finding solutions for such hazards	● The Necessity for Digital Citizenship ● Digital Citizenship for Children and Young People
● Discussing the reflection model with sample scenarios ● Determining online shopping steps ● Getting to know the advantages of e-commerce ● Security methods for e-commerce ● Methods of image transfer into mobile phones ● Security methods for mobile phones ● Security methods for e-mail use ● Security methods for social networks	● Digital Citizenship within the Family ● Digital Citizenship within the Educational Institutions
A Post Achievement Test (digital citizenship), Post-Test (self-regulation, self-directed learning, information literacy)	

Data Collection

In this study, a digital citizenship achievement test and self-regulation, self-directed learning, and information literacy scales were employed.

Digital Citizenship Achievement Test

While forming a multiple choice achievement test, sources about digital citizenship were reviewed and 36 draft questions were prepared. After being proofread by language experts, these questions were turned into a test which would be applied to a pilot scheme on a different group (N=147). After analyzing the results, in accordance with content validity, invalid items and items that have a very low differential value were omitted from the achievement test. As a result, the achievement test that comprised of 25 questions covering all objectives was administered in this study. Such parameters as reliability coefficients related to the achievement test are presented in Table 3 and Table 4.

Table 3. Parameters as Reliability Coefficients Related to the Achievement Test

Item	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
Difficulty	.73	.78	.91	.91	.56	.97	.93	.8	.87	.86	.73	.75	.85
Discrimination	.32	.38	.4	.25	.51	.46	.54	.36	.49	.33	.37	.24	.27
Item	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	
Difficulty	.49	.82	.39	.84	.7	.69	.52	.5	.78	.66	.33	.5	
Discrimination	.17	.59	.29	.55	.46	.53	.46	.33	.48	.36	.34	.19	

Table 4. Reliability coefficients and standard errors of the achievement test

N	S	Maximum	Median	Mean	Alpha
147	3,88	24	18	17,75	0,73

Self-Regulation Scale

The self-regulation scale used in this study was developed by Arslan and Gelisli (2015). The internal reliability coefficient of the original scale was calculated to be .90. It has 16 items with the levels from “Never” to “Always” from one to five and consists of two dimensions which are “Being Open” and “Quest”. Sample items in this scale include a) I can easily learn even the most difficult subjects if I need to, b) I try to use other methods while learning a subject.

Self-Directed Learning Scale

In order to evaluate the self-directed learning levels of students, the 28-item scale developed by Suh, Wang, and Arterberry (2015) for adults and adapted into Turkish by Celik and Arslan (2016) was employed. The instrument was a 5-point Likert-type scale with the options of (1) Never (2) Rarely (3) Often (4) Usually and (5) Always. The internal reliability coefficient was .93 for the overall scale. Sample items in this scale include a) I always deliver my assignments on time, b) I prepare a study plan before I start to work, c) I adjust the date and time of my work and assignments when necessary.

Information Literacy Scale

While determining students’ information literacy levels, a 5-point Likert-type scale with the levels from “Never” to “Always”, developed by Adiguzel (2011) was used. The internal reliability coefficient of the original scale was determined to be .92. The 29-item scale comprised four factors. These were ‘Identifying Information Needs’, ‘Access to Information’, ‘Using Information’ and ‘Ethical and Legal Regulation on the Use of Information’. Sample items in this scale include a) I access and use information legally, b) I can indicate accurately the original sources of the information used, and c) I classify the obtained information according to certain criteria.

Findings

The data collected in this study were analyzed with SPSS 21.0 program by using inferential statistics techniques. Both parametric and non-parametric techniques were implemented for the analysis of the data. The alpha significance level for each quantitative analysis was set as 0.05. Mann Whitney-U test was conducted as the data did not meet the normality assumption for the learning performance and information literacy.

We began the study by examining the equivalence of research and control groups. To do so, prior to the implementation phase, we analyzed the scores that participants got from digital citizenship achievement test and self-regulation, self-directed learning, and information literacy scales.

Learning Performance

The descriptive results obtained from pre and post digital achievement tests are presented in Table 5. The average scores that control and research groups obtained from pre and post digital citizenship achievement test compared via Mann Whitney U-test. Results are presented in Table 6.

Table 5. Descriptive Statistics on Learning Performance Scores

Variable	Group	M	SD	Min	Max
Pre-test	Research	80.15	8.6	50	91
	Control	81.45	5.03	71	88
Post-test	Research	83.30	5.03	67	95
	Control	82.20	4.84	69	91

Table 6. Comparison of Research and Control Groups' Digital Citizenship Achievement Pre- and Post-test Scores

Variable	Group	N	Mean Rank	Sum of Rank	U	p
Pre-test	Research	26	32.63	848.5	360.5	.29
	Control	33	27.92	921.5		
Post-test	Research	26	35.08	912	297	.04
	Control	33	26.00	858		

As shown in Table 6, our findings demonstrate that there is not any statistically significant difference between research and control groups with regards to their learning performance on pre-test scores (U=360.5; p=.29; p>.05). These results illustrate that, prior to the research, subject matter knowledge of students in both group was similar to each other. Our findings also demonstrate that there is a statistically significant difference between research and control groups with regards to their post-test performance scores (U=297; p=.04; p<.05). While the mean rank for research group students is found to be 35.08, it was determined to be 26.00 for control group students. These results illustrated that the flipped classroom model has a positive effect on students' learning performance when compared to traditional methods.

Self- Regulated Learning

The descriptive results obtained from pre and post self-regulated data are presented in Table 7. The average scores that control and research groups obtained from pre-test on self-directed learning were compared through independent samples t-test. Results are presented in Table 8.

Table 7. Descriptive Statistics on Self-Regulated Learning Scores

Variable	Group	M	SD	Min	Max
Pre-test	Research	63.61	6.15	53	77
	Control	62.36	6.81	45	77
Post-test	Research	61.5	8.35	36	78
	Control	62.93	6.23	52	77

Table 8. Comparison of Research and Control Groups' Self-Regulated Learning Pre-test and Post-test Scores

Variable	Group	N	M	SD	df	t	p
Pre-test	Research	26	63.61	6.15	57	.33	.73
	Control	33	62.36	6.81			
Post test	Research	26	61.50	8.35	57	.74	.45
	Control	33	62.93	6.23			

According to the results of the independent samples t-test, no significant difference was found between the research and control groups with regards to their pre-test scores [t(57)=0.33, p=0.73>.05]. As seen in Table 8, while the average post-test score of research group was found to be M =61.50, it was calculated to be M = 62.93 for the control group. According to the results of the independent samples t-test, no statistically significant difference was observed between research and control groups with regards to their post-test scores [t(57)=0.74, p=0.45>.05]. This finding shows that flipped classroom has no effect on students' self-regulated learning.

Self-Directed Learning

The descriptive results for pre and post achievement tests are presented in Table 9. The average scores that control and research groups obtained from pre-test and post-test on self-directed learning were compared through independent samples t-test. Results are presented in Table 10.

Table 9. Descriptive Statistics on Self-Directed Learning Scores

Variable	Group	M	SD	Min	Max
Pre-test	Research	160.73	11.29	93	138
	Control	105.75	10.69	83	128
Post-test	Research	110.34	10.03	95	134
	Control	108.6	12.44	84	132

Table 10. Comparison of Research and Control Groups' Self-Directed Learning Post-test Scores

Variable	Group	N	M	SD	df	t	p
Pre-test	Research	26	160.73	11.29	57	.33	.73
	Control	33	105.75	10.69			
Post-test	Research	26	110.34	10.03	57	.57	.56
	Control	33	108.60	12.44			

As shown in Table 10, no significant difference was observed between research and control groups with regards to their pre-test scores [t(57)=.33, p=.73>.05]. According to the results of the independent samples t-test, no statistically significant difference was observed between the research and control groups with regards to their pre-test scores [t (57) =.57, p=.56>.05]. While the average post-test score of research group was found to be M =110. 34, it was calculated to be M = 108.60 for the control group. This finding illustrates that flipped classroom has no effect on students' self-regulated learning.

Information Literacy

The descriptive results obtained from the pre and post achievement tests are presented in Table 11. The average scores that control and research groups obtained from pre-test on information literacy were compared via Mann Whitney U-test. Results are presented in Table 12.

Table 11. Descriptive Statistics on Information Literacy Scores

Variable	Group	M	SD	Min	Max
Pre-test	Research	107.41	23.34	48	143
	Control	112.51	16.14	64	140
Post-test	Research	110.91	21.20	32	140
	Control	113.96	16.91	59	141

Table 12. Comparison of Research and Control Groups' Information Literacy Pre-test and Post-test Scores

Variable	Group	N	Mean Rank	Sum of Rank	U	p
Pre-test	Research	26	27.87	724.5	373.5	.39
	Control	33	31.68	1045.5		
Post-test	Research	26	28.19	676.5	376.5	.75
	Control	33	29.59	976.5		

As seen in Table 12, our findings show that there is not any significant difference between research and control groups with regards to information literacy pre-test scores (U=373.5; p=.39;p>.05). The findings also show that there is not any significant difference between research and control groups with regards to information literacy post-test scores (U=376.5; p=.75; p>.05). Whereas the mean rank for research group students is found to be 28.19, it was found to be 29.59 for control group students. These results illustrate that the flipped classroom has no effect on students' information literacy skills.

Discussion and Recommendations

The development and prevalence of technological tools and computer networks are changing the conditions of daily life. According to the data from Turkish Statistics Institution (TUIK, 2017), the rate of having a website or a homepage of the organizations that have commercial activities in Turkey in 2017 has risen to 73%. In parallel to the development of public institutions and commercial enterprises in the world and in Turkey, developments of their online services are gaining speed. The e-government services are adding innovations day by day and the number of people using them is also increasing. The subjects that should be known by the citizens who want to benefit from these services have to come to the forefront to use these services correctly, efficiently and in the desired way. In order to ensure a healthy adaptation to this change process, the education of digital citizenship issues is gaining importance. The behaviors in digital citizenship education which include affective domain behaviors are difficult to be gained with traditional methods employed in formal education settings. Thus, the teaching of these subjects with different instructional methods come into prominence.

Students learn many concepts, behaviors, and values from their social environment (Bandura, 1977). It is important that effective use of time in formal education is vital to make students gain these behaviors. For this reason, we have examined whether a five-week implementation of the flipped classroom model had any impact on such variables as learning performance in digital citizenship, self-regulated learning, self-directed learning, and information literacy skills. The major contribution of this study is that integrating the flipped classroom into digital citizenship could increase students' learning performance better when compared to traditional methods. The result obtained here is consistent with that of previous studies which compared the flipped classroom with traditional methods (Baepler et al., 2014; Bhagat et al., 2016; Chao et al., 2015; Olakanmi, 2017; Turan & Goktas, 2016; Zhonggen & Guifang, 2016). The increase in students' achievement could also be explained by certain characteristics of the flipped classroom such as student-teacher interaction, immediate feedback, and preparation before coming to the class (Alsancak-Sirakaya & Ozdemir, 2018). Besides, this finding can result from the fact that learning the subjects outside the class provided students with the opportunity to investigate the related subjects deeply during the class time (Burke & Fedorek, 2017). Learning activities on digital citizenship such as making online shopping safer and creating sample scenarios about the negative impacts of digital technologies have been very useful not only to enhance students' engagement in the classroom but also support their cognitive and affective learning domains. These activities have also provided more active and permanent learning for students by reinforcing the subjects better. Thus, active learning processes such as discussion, hands-on activities, and problem-solving should be placed more emphasis in a lesson plan (Al-Zahrani, 2015; O'Flaherty & Phillips, 2015).

Other results of the present study show that the flipped classroom has no effect on students' self-regulated learning, self-directed learning and information literacy skills. The fact that

students might give false responses to the scale items could be the reason for no differences. Thus, different data collection tools such as reflection papers and observation forms could be utilized in order to determine the skills of students. In addition to that, considering the length of the implementation process, it is not surprising that we had not observed any meaningful difference in the scores that both groups got from the scales. According to Turan and Goktas (2016), students' familiarity with the use of new techniques in learning environments requires a long time period. Before implementing the flipped classroom in learning environments, the objectives and activities of the flipped classroom should be explained since students may show resistance to accepting new practices (Al-Zahrani, 2015).

We hope that this research will make a significant contribution to studies that seek to enhance students' learning outcomes in digital citizenship topics through contemporary methods and techniques. The present study mainly examine the relationship between the flipped classroom model and various variables. Therefore, similar studies that include some other variables with more extensive sampling are needed so that they could help validate the findings revealed within this study. Moreover, we believe that such similar studies will also shed more light on the relationship between the flipped classroom model and digital citizenship instruction.

Considering all these results, we can make some suggestions for instructors who intend to use the flipped classroom model in digital citizenship instruction. First, they should plan entertaining and meaningful learning activities to prevent students' distraction and boredom. For example, it may be more fun for students to play the role of the characters within the scenarios in which they write. Second, instructors could use videos as teaching resources to attract students' interest in the topics instead of traditional PowerPoint presentations.

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