BENEFIT COMPARISON OF CAPTIONED ONLINE COURSES FOR AMERICAN, INTERNATIONAL, AND DEAF/HARD OF HEARING STUDENTS: FROM THE VIEWPOINT OF INDIVIDUAL VALUE AND TOTAL VALUE

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Abstract: This study evaluated benefits toward Captioned Online Courses (COC) among American, International, and Deaf/Hard of Hearing (DHH) students from two California universities. As a result, COC were not just viewed as accommodations for DHH students, but also as providing benefits for American and International students. Study results indicated that international students showed higher individual value for COC than the other groups. American students had the smallest individual value but presented the larger total value toward COC than the other groups due to their comprising the largest population at both universities. The aggregate total value for all groups was approximately $2,000,000.00, which would represent the cost of conducting 370 classes at the lowest price of $2.00 per minute. These results indicate the possibility of expanding future COC as Universal Design model for postsecondary educational institutions.

Introduction

Statement of the Problem

The development of Information Technology has influenced Deaf and Hard of Hearing (DHH) people's social environment, even as DHH people have experienced a lack of access to voice information and communication (Shinohara & Wobbrock, 2011). Information Technology improvements, including cochlear implants, hearing aids, videophones, relay services and other technologies, have changed DHH people's lifestyles, while also producing a new issue; the lack of accessibility of electronic resources (Burgstahler, 2002; Hilzensauer, 2008). Human rights laws for people with disabilities, such as Section 508 of the U.S. Rehabilitation Act (U.S. Department of Education, 2013), and the Web Content Accessibility Guideline (WCAG) 2.0 (W3C, 2012), require accessibility services for electronic resources, such as adding captions to online videos. Section 508 of the U.S. Rehabilitation Act requires to access to electronic resources at federal educational institutions (U.S. Department of Education, 2013), while WCAG 2.0, an international guideline for federal and private educational intuitions regarding access to electronic resources for reference purposes (W3C, 2012).

The researcher conducted email interviews with six universities regarding universal design awareness, and 14 universities regarding universally captioning access on campus. Some major universities have found themselves unable to provide for DHH students' accommodations prior to the DHH students' enrolling in and registering for specific courses. Interpreters must have specifically-trained skills in order to translate technical terms on an academic level, so it is challenging to find an interpreter who fits a DHH student's need for all classrooms. Other DHH students may prefer captioning services, but, at times, captionists may not provide sufficient accessibility services due to the lag time when typing quick dialogs such as class discussions or films.

Specifically for captions in online classes, the researcher obtained estimated prices for online lectures with captions from 10 captioning agencies. The cost of adding captions to online videos ranges from $0.62 to $8.00 per minute, and from $35.00 to $480.00 per hour. The cost depends on the duration of the video lecture, the speed and quality of sound, the type of media, the length of submission, the transcript request, and any discounts. As a part of federal educational laws, colleges and universities, which receive federal money are required to cover the costs of captioning services to make videos accessible to DHH students (U.S. Department of Education, 2013). Unfortunately, producing captioned videos requires higher per capita costs, even for only one DHH student. This issue may be a cause for the lack of popularity of online video lectures with caption since the costs for producing captioned online videos may be higher than the profits for those who produce them.

From another viewpoint, that of a Universal Design approach, the benefit of captioning is considered for not only those who are DHH, but also for International and American students who are English as Second Language (ESL) learners to provide materials without experiencing language barriers (Zanon, 2006). The concept of Universal Design is to design institutions, products, and technological information to ensure that all people have access to information without any barriers (Udo & Fels, 2009). Existing literature already indicates positive educational and learning outcomes for DHH and ESL students through the use of captioned videos or captioned televisions (Huang & Eskey, 2000; Bowe & Kaufman, 2001; Markham, Peter, & McCarthy, 2001; Lewis & Jackson, 2001; Danan, 2004; Rowland, 2007; Holmes, Rutledge & Gauthier, 2009). However, little research is available which presents the benefits of captioning services and the educational outcomes for American students who are hearing and native speakers.

Purpose of the Study

When considering the popularization of COC, a discussion regarding the high cost of captioning services is unavoidable. As a part of this consideration,

the purpose of the study is to present a new perspective regarding the introduction of Captioned Online Courses (COC), defined as online video lectures with captions, for college students in the following four groups: (a) American Native Speakers, (b) American ESL Learners, (c) International Students, and (d) DHH Students.

As a matter of course, the individual value toward COC is expected to be divided between a group that has higher value toward COC and another group that has lower value toward COC. However, from the viewpoint of popularity of COC, a total amount gathered from individual values is more important than the individual value. The total value toward COC could be significantly affected by a number of individual values, rather than only the group that has highest singular value toward COC. If the results of this study reveal that the American groups which are hearing and occupy a majority of the total student population might have great value toward COC for better learning in English, this could become the catalyst and power to popularize COC.

Therefore, this study proposes taking two approaches: (1) estimating the individual value of COC for each group: American Native Speakers, American ESL Learners, International Students, and DHH Students, and (2) estimating the total value of COC for each cluster, which is measured as the individual value multiplied by the number for the group. In this way, the benefit of COC may be considered for not only the DHH group, but also for the American and International groups who can hear. To make this point clear, two hypotheses are presented below.

Research Question and Hypotheses

This study leads with one research question: Which group of American, International, and DHH students receives a large benefit from Captioned Online Courses? Two hypotheses are adapted as follows:

Hypothesis One: The International group has a higher individual value for COC than that of the other groups. The first hypothesis presents the ranking of individual values as International > DHH > American ESL Learners >

American Native Speakers. The International students may have more personal value for COC because they want to improve their listening and reading skills in English. The DHH group may include two types: DHH students who are signers and who prefer to take an online class with an interpreter, and other DHH students who are non-signers and who prefer to take COC. The American group also includes two types: American ESL Learners and American Native Speakers. American ESL Learners may have more particular value for COC than American Native Speakers because they may prefer to watch captions rather than listening since their second language is English. Other American Native Speakers may prefer to listen rather than watching captions as their mother tongue. Both groups may place special value on COC for better learning opportunities.

Hypothesis Two: The American group's total value for COC is higher than the other groups. The second hypothesis presents the ranking of the total value as American > International > DHH. Due to limited data access, this study integrates the two types of Americans as one group for data analysis. Even if the individual value of the American group is less than that of other groups, the population of the American group is much larger than that of the other groups, so the total value of the American students for COC is expected to be larger than that of other groups. Even if the individual value of the International group is higher than that of other groups, the population of the International group is smaller than the American group, so the total value of the International students for COC is expected to be second after American group. The population of DHH group is much smaller than that of the other groups, so the total value for the DHH students is expected to be lower than the other groups.

If these hypotheses are accepted, COC should be strongly recommended, not just for the DHH group for reasonable accommodation, but also for the larger populations of the American and International groups for better learning opportunities.

Methodology

Questionnaire

The target population consists of four categories: (a) American students who are native speakers, (b) American students who are ESL learners, (c) International students, and (d) DHH students attending a California Private University (CPU) and a California State University (CSU). All subjects are over 18 years old. An online survey link was forwarded to each of the groups via mass email.

The questionnaire was divided into three main parts: Part A, Introduction; Part B, Benefit Evaluation Questions; and Part C, Students' Backgrounds. In the questionnaire, Part B estimates each group's individual values and asks about their willingness to pay (WTP) for a captioned online course at their maximum rate of averaged tuition fees per year. This study uses Contingent Valuation Method (CVM), which is widely used for a majority of environmental economic research (Mitchell & Carson, 1989; Carson, 2000; Bateman et al., 2002). The theoretical framework of CVM was adapted to estimate the economic profits to be gained from these groups in regards to COC. CVM evaluates WTP to get better services, and this study examines WTP for taking COC. Check List CVM, which is used in this survey, is useful for a small sample population (Mitchell & Carson, 1989; Bateman et al., 2002). The Check List CVM presents a series of different values that users would be willing to pay, and asks participants to check the item in the values list that most closely resembles their opinions (Bateman et al., 2002). The Part B, Evaluation Question represents as follows:

> Imagine that your selected course has two optional online class choices: (a) a captioned video online lecture and (b) a non-captioned video online lecture. What percent would you be willing to pay for a captioned online class rather than for a non-captioned online class? Please remember that the payment for captioned online classes is withdrawn from our budget.

- Even if the two classes are given for the same fee, I do not want to take a captioned online class.

- If the two classes are given for the same fee, I want to take a captioned online class.

- If the percentage is under 2% in additional fees, I want to take a captioned online class.

- If the percentage is under 3%…

- If the percentage is under 5%…

- If the percentage is under 7%…

- If the percentage is under 10%…

- If the percentage is under 15%…

- If the percentage is under 20%…

- If the percentage is under 30%…

- Other ( ) %

- Don't know

ANOVA for Examining Hypothesis One

Survey questions for *Hypothesis One* such as the Part B, Evaluation Question sample above were analyzed using a one-way analysis of variance (ANOVA) and multiple comparisons in SPSS Version 20.0 (IBM, 2011). The statistical analyses were used to compare the differences in WTP for each of the four groups. This study used *WTP Rates* as a scale of individual value, defined as the increased tuition rate toward COC per alternative choice. In other words, *WTP Rates* refers to the percentage that students would be willing to pay for COC in additional tuition fees.

Calculation of Total Value for Examining Hypothesis Two

The total value of WTP for each group is calculated by multiplying the mean of the WTP Rates by the amount of each of the target populations per campus, and by the return rates, in order to prevent overestimation of the responders' total values. This study estimates the respondents' total values by multiplying the return rates, which means the WTP of non-respondents is assumed to be $0. This study compared each group's total value toward COC, and ranking and estimating the total costs per campus as a whole.

Results

Overview of Survey

The researcher contacted all of the CPU's and CSU's departments for survey permission, and obtained permission from 16 out of 73 of the CPU's departments, and 10 out of 54 of the CSU's departments. As the survey link was sent via mass email, it is unknown how many students received the survey link from these departments. Excluding the 248 uncompleted responses, the total response rate consisted of 1,579 responses from the CPU, and 207 responses from the CSU. All data information of students was divided into four groups based on the answers of Part C, Student Backgrounds, for identifying how respondents' backgrounds influence their individual values toward COC. The return rates were: 8.30% at the CPU, and 3.10% at the CSU (See Table 1). Table 2 shows different characteristics of four groups: American Native Speakers (NATIVE), American English as Second Language Learners (ESL), International Students (INTL), and DHH Students (DHH) (See Table 2).

Table 1. Summary of Survey.

University	CPU	CSU
Survey Method	Qualtrics Survey	Qualtrics Survey
Survey Period	08/25/11-11/11/11	08/25/11-10/25/11
# of Departments	73	54
# of Permitted Departments	16	10
Target Population	38,000	36,911
# of Students Sent Survey	19,028	6,674
Respondents	1,799	235
Total Effective Respondents	1,579	209
Return Rate	0.083	0.031

Table 2. Characteristics of Effective Respondents.

University	CPU	CSU
NATIVE	877	131
ESL	160	16
INTL	404	25
DHH	138	37
Total	1,579	209

Individual Value for COC

WTP rates for the four groups by combined campuses. The first approach is One-way ANOVA to compare with the single value for each of the four groups, combining the data from the CPU and CSU. *WTP Rates* is the increased tuition fee rate toward COC. Table 3 presents the differences among the means of the *WTP Rates* toward COC, as a scale of individual value, varied: American ESL Learners at 3.431%, International Students at 2.016%, DHH Students at 1.741%, and American Native Speakers at 0.942%. The result represents that at least one group has shown a different *WTP Rate* compared to the rest of groups' *WTP Rates* at a rate of $p < .01$ ***.

Table 3. One Way ANOVA: Comparison in Four Groups.

Descriptive Variables	NATIVE	ESL	INTL	DHH	*p* value
WTP Rates	0.942	3.431	2.016	1.741	0.000 ***
N	934	159	411	162	Not applicable

Therefore, to examine the full detail of the differences of *WTP Rates* for the four groups, Table 4 presents multiple comparisons for the *WTP Rates* for each of the four groups. The *WTP Rate* of American Native Speakers was statistically significant from that of American ESL Learners and International Students, at a rate of $p < .01$***. Also, the *WTP Rate* of American ESL Learners was statistically significant from that of International Students and DHH Students, at a rate of $p < .01$ ***.

Table 4. Multiple Comparison: WPT Rate In Four Groups.

WTP Rates	ESL	INTL	DHH
NATIVE	0.000 ***	0.000***	0.131
ESL	Not applicable	0.003***	0.003***
INTL	Not applicable	Not applicable	0.902

From the above results, *Hypothesis One's* rank of individual values as International > DHH > American ESL Learners > American Native Speakers, is partly accepted. Comparing each of the four groups' *WTP Rates*, the rank of individual value is represented as American ESL Learners > International > DHH > American Native Speakers. The result indicates that American ESL Learners have higher personal values toward WTP than the other groups, even though International students are also ESL learners.

WTP rates for the three groups per campus. The second approach is to estimate the total value toward COC, and it requires getting an exact number for the student population for each of the four groups per campus. However, the study was unable to identify the exact amount of the student populations of American Native Speakers and American ESL Learners per campus. Thus, this study integrated the two groups in order to calculate the American students' total values as one group, and compared the *WPT Rates* for each of the three groups.

Therefore, the means of the *WTP Rates* toward COC was recoded into three groups: American students (USA), International students (INTL), and DHH students (DHH) for each campus (See Table 5). As a result, the means of the *WTP Rates* at the CPU were: 2.115% for International students, 1.793% for DHH students, and 1.291% for American students. The groups at CPU showed as being statistically significant at the level of $p < .01$***. Thus, the result from the CPU indicates that the ranking of individual value in the three groups should be presented as International students > DHH students > American students. On other hand, the means of the *WTP Rates* toward COC

at the CSU were: 1.544% for DHH student, 1.402% for American students, and 0.417% for International students (See Table 5). Although the International students' *WTP Rates* at the CSU was lower than the other groups, the groups at the CSU showed no statistical differences among the three groups at a rate of *p* < .01.

Table 5. Group Comparison of Three Groups Per Campus.

WTP Rates	USA	INTL	DHH	*p* value
CPS	1.291	2.115	1.793	0.006***
CSU	1.402	0.417	1.544	0.531

Total Values toward COC

At the CPU and the CSU, each group's total value toward COC was multiplied by the mean of the increased tuition rate per year, the means of *WTP Rates*, the total student population, and the return rates.

Total values at CPU. Multiplying the tuition average per year 2011-2012 of $42,818 by the mean of the *WTP Rate*, the individual value for COC at the CPU was estimated as $905.60 for International students, $767.71 for DHH students, and $552.73 for American students.

 The CPU's total student population in the fall of 2011 was 38,000. International students were 7,226 of that total.   DHH students were estimated to number approximately 200, as 10 DHH students were officially registered by Disability Services, but the rest of students who identified as DHH were possibly not yet registered. American students were estimated to be 30,574, which were subtracted from the International and DHH student populations.

Table 6. Mean of Individual Value and total Value Toward Captioned Online Courses.

University	CPU	CSU
Effective Return Rate	0.0830	0.0310
Average of Tuition Fees	$42,818	In State Citizens: $5,076 Out of State Citizens: $21,312
Total of All Students	38,000	36,911
USA	30,574	34,422
INTL	7,226	2,489
DHH	200	200
Individual Values		
USA	$552.73	$71.14
INTL	$905.60	$88.87
DHH	$767.71	$78.37
Total Values		
USA	$1,402,630.86	$75,956.32
INTL	$543,140.84	$6,857.12
DHH	$12,743.98	$485.89
Overall Group	$1,958,515.68	$83,299.33

This study also calculated the return rates, dividing the respondent rate by the number of students who were sent the survey, calculating the total values multiplied by the return rates, in order to avoid overestimation regarding the total values for COC. The return rates were shown to be: 8.30% at CPU, and 3.10% at CSU (See Table 1's Recollection Rate section).

Overall, considering return rate and calculating the total value per group at the CPU revealed that values toward COC were: $1,402,630.86 for American students, $543,140.84 for International students, and $12,743.98 for DHH students. The overall total value for all groups was $1,958,515.68 (See Table 6).

Total values at CSU. The in-state tuition average per year 2011-2012 was $5,076.00 for American and DHH students and the non-in-state tuition average per year was $21,312.00 for International students. In the same manner as the calculation for the CPU, the estimated individual values for COC at the CSU were obtained, resulting in: $71.14 for American students, $88.87 for International students, and $78.37 for DHH students.

The CSU's total student population in the fall of 2011 was 36,911, and International students represented 2,489 of that total. DHH students were estimated to number approximately 200 with 163 DHH students were registered by DHH Services, but the rest of students who identified as DHH were possibly not yet registered. American students were estimated to total 34,442, and were subtracted from the International and DHH student populations.

Considering return rate and calculating the total value per group for the CSU reveals that the values for COC were: $75,956.32 for American students, $6,857.12 for International students and $485.89 for DHH students. The overall total value for all groups was $83,299.33 (See Table 6).

Discussion

Individual Values of COC in the All Groups

First, this study combined the results from the CPU and CSU and compared them with the WPT Rates for each of the four groups: American Native Speakers, American ESL Learners, International, and DHH. This study assumed the original ranking of individual value as International > DHH > American ESL Learners > American Native Speakers. However, the actual rank of individual value was: American ESL Learners > International > DHH > American Native Speakers.

The results indicate that American ESL Learners have higher individual values toward COC than the other groups, even though International students are also ESL learners. American ESL learners and International students may have similar reasons for wanting to take COC in order to improve their listening skills in English, while DHH students may have other reasons, such as wanting full access to speech information. American Native Speakers had lower individual values than the other groups, as they may not need often to depend on captioning.

Second, the individual values for the four groups by combined campuses as a result of a one-way ANOVA were shown as being statistically significant. However, the individual values by dividing into three groups per campus in a one-way ANOVA was shown to be statistically significant at the CPU, but not at the CSU. The main cause for this was insufficient sampling size for data analysis: 147 for American students, 37 for DHH students, and 25 for International students at the CSU, as compared with a sufficient sampling size at the CPU: 1037 for American students, 404 for International students and 138 for DHH students (See Table 1's Effective Respondent section). Therefore, Table 1 and Table 2 represent a statistically significant difference for the group comparisons by combined campuses due to the sufficient sampling size of the CPU.

Furthermore, compared to the population rate of American Native Speakers, the population rate of American ESL Learners was smaller, comprising 15.40% of the total American group at the CPU and 10.90% of the total American group at the CSU who were ESL.

As a result, integrating the two groups of American Native Speakers and American ESL Learners, this study found that the American group was affected by a vast majority of in population of American Native Speakers. In addition, 88% of the total respondent rate was occupied by CPU's student population. Therefore, the results from the four groups were affected by the large majority of the CPU's population. In summary, the data analysis for Americans was influenced by a majority of American Native Speakers and the data analysis for the combined universities was impacted by CPU respondents.

Total Values of COC

The American students' mean of the *WTP Rate* is lower than that of the International students and the DHH students. However, a large number for the American student population rate resulted in higher American students' total value regarding COC than for the other groups' total values. The population ratios of absolute values between American and International students from the two universities could apply to other California State Universities or all universities in the United States which have similar population ratio.

This study considered the return rates in order to avoid overestimation of the total values for COC. The aggregate total value for all groups from the CPU and the CSU was evaluated to be approximately $1,900,000.00 per year and $83,000.00 per year respectively, despite having a 91.70% no response rate at the CPU and a 96.90% no response rate at the CSU. In addition, the online survey was sent to only 16 of 73 departments at the CPU and 10 of 54 departments at the CSU. A higher collection would be realized if the online survey had been sent to all of the departments at both the CPU and the CSU. At that rate, the overall total values may be expected to be over $2,000,000.00 throughout year, and not just per year.

Possible Offer of COC Lectures

The study calculated the number of conducting COC as a three-hour lecture per class by dividing the aggregate total values by the cost of offering COC, based on the lowest price of $2.00 per minute, or the average price of $5.00 per minute. Table 7 represents 370 classes conducted at the lowest price, and 148 classes held at the mean rate.

Table 7. Estimated Breakdown of Captioned Online Courses.

Price of Captions	$2.00 per minute	$5.00 per minute
Price of one class	$2 × 180min =$360	$5 × 180min =$900
Price of 15 weeks (one semester)	$360 × 15 =$5,400	$900 × 15 =$13,500
# of classes per year	$2,000,000 / $5,400 = 370	$2,000,000 / $13,500 =148

Overall, the information from this study contributes the idea that not only DHH students, but also International and American students would prefer to take COC. Therefore, it is essential that universities establish investigation committees to examine students' benefits for COC thoroughly, which will be of great value in developing a project tailored to increasing the number of COC offered.

Conclusion

In past studies, captioned videos have been viewed as a benefit primarily for ESL and DHH students. However, this study reveals that COC are not just accommodations for DHH students but can also benefit American and International students as well. International students were shown to have higher individual values toward COC than did other groups. Furthermore, American students have demonstrated the potential for higher benefits from COC than the other groups because of the large amount of student

population. Assuming the WTP of non-respondents to be $0, regardless of the lower return rates of 8.30% at the CPU and 3.10% at the CSU, the total value for the populations from all groups at both universities was estimated at approximately $2,000,000.00 per year, which would cover the cost of conducting 370 classes at the lowest price of $2.00 per minute or 148 classes at the average price of $5.00 per minute.

The effectiveness of this project contributes to the promotion of the Universal Design model for postsecondary educational institutions. Offering COC to International students in other countries, or to American students in other states, may help improve their academic achievement, as compared to students who do not partake in COC. The more American students who are interested in taking COC, the more tuition income supports the budget necessary for providing COC, which generates positive feedback. In addition, development of an online course curriculum that offers COC internationally may lead to COC becoming popular with a large number of International students.

More importantly, COC is an essential accessibility service for students who have slight or mild hearing loss and who are non-signers. Despite the fact, Disability Services at the CPU registered only 10 DHH students, the survey collection identified 138 students who reported slight or mild hearing loss. That is, DHH students who have slight or mild hearing loss may not register Disability Services at universities.

Unfortunately, although this research analyzed the expected educational and economic valuations toward COC, there were limitations. The survey collection rates were 8.30% at the CPU and 3.10% at the CSU, so a university would need to examine all of the students' values toward COC thoroughly. The online survey was conducted with college students, and most of the responders were possibly interested in taking COC, which represents the characteristics of these subjects. If most of the subjects were enrolled at California State Universities, the study may show different results. This study estimated the effectiveness of COC popularization economically, but whether the total value of COC is higher than the costs of captioning services has yet to be discussed.

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