Chi Square Mobile for Emergency Onlined Courses Field Test Results

A Preprint

April 3 2021

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Abstract

At the onset of the COVID pandemic, thousands of courses were emergency onlined.
As a response to these new and unfamiliar conditions a mobile app was developed and deployed to mitigate some of the learning loss produced. This paper presents experiences and related findings from this deployment.

1 Introduction

In the Republic of Argentina the COVID-19 pandemic was declared toward the end of February of 2020. Our geographic location in the southern hemisphere meant that it his toward the end of summer, with most schools coming off a two-month summer break. The emergency measures put in place by public health authorities meant that thousands of courses which would normallly be taught in a face-to-face setting would now have to be onlined. While most institutions have access to learning management systems, these sytems were unfamiliar to most instructors and widely deemed unsuited for the purpose, and most instructors opted for a synchronous format using some kind of videoconferencing system such as Meet, Teams or Big Blue Button. Legal and administrative requirements stating that a course session needed to have a start and end time also tilted the weight in favor of these options.

2 The Concept of Learning Loss

2.1 Non verbal communication

3 The Chi Square Mobile App

In the given

Build with several R packages, the most important ones of which were: {shinyMobile}(Granjon, Perrier, and Rudolf 2020) and {chi2Mobile}(Dietrichson and Pagnone 2020).

In Figure 1 we see the main interfaces.

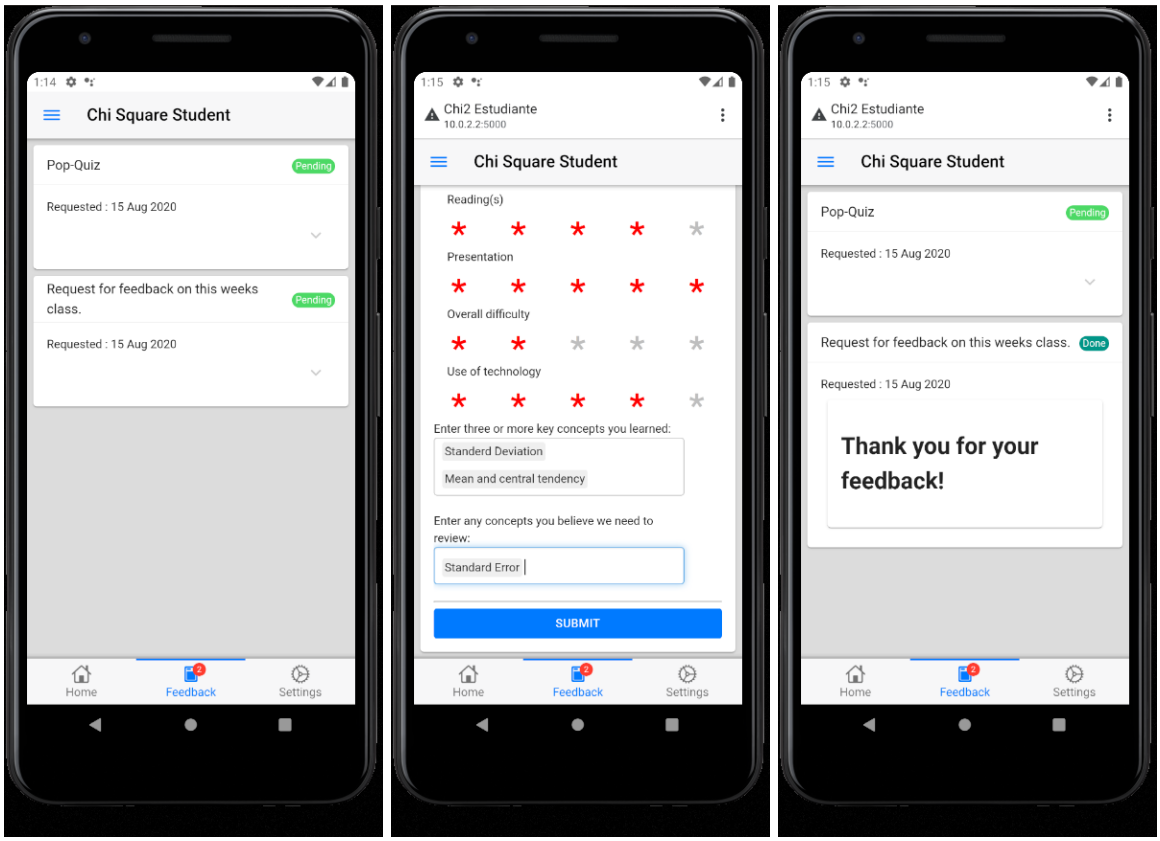

Figure 1: Main App Interfaces for the Student

Figure 2 Shows some of the interfaces available for the instructor.

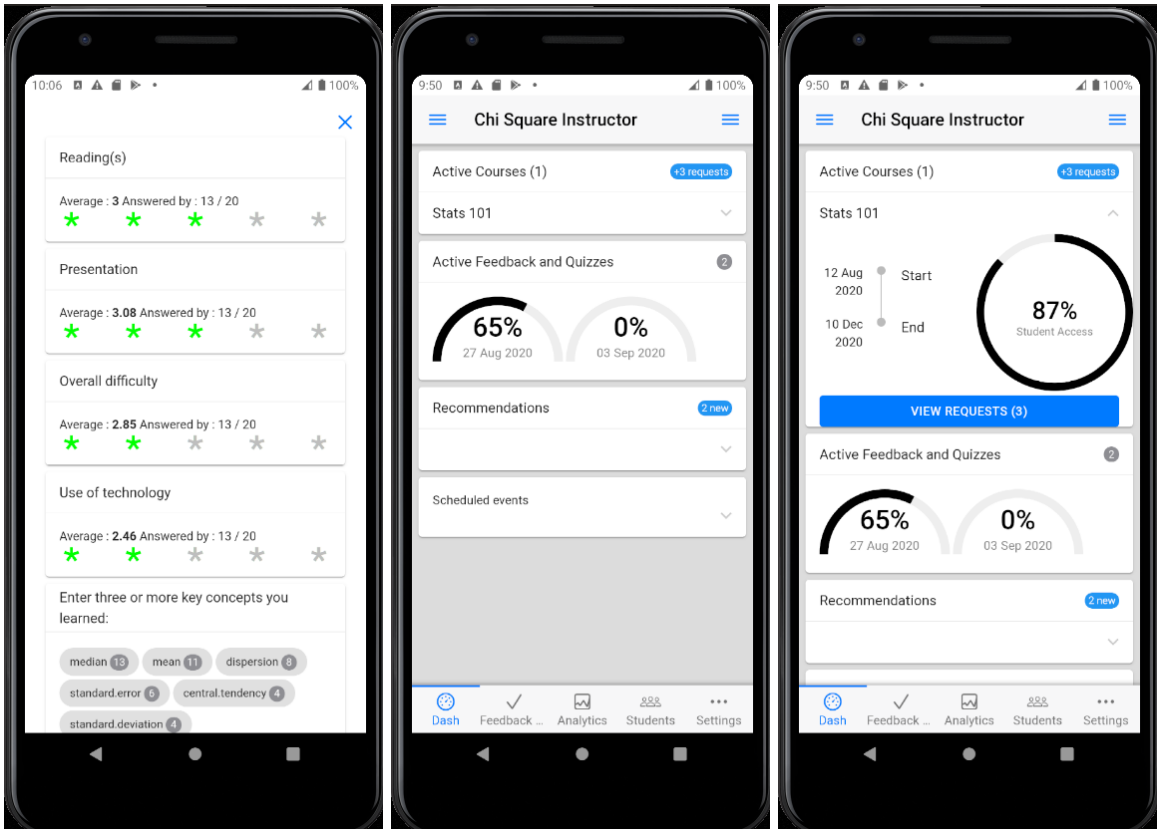

Figure 2: Main App Interfaces for the Instructor

4 Context and Participants

A cohort of 61 students, enrolled in *Gramatica*, an introductory level linguistic course taught by one of the authors, were asked to download and install the application on their devices. A total of 37 complied with these instructions and responded at least once. The course had a duration of sixteen weeks, with additional final exam options at the end of the semester. Figure 3 shows the number of students who responded to the request for feedback during the semester. We see a sharp drop-off in week six, and a relatively stable number thereafter.

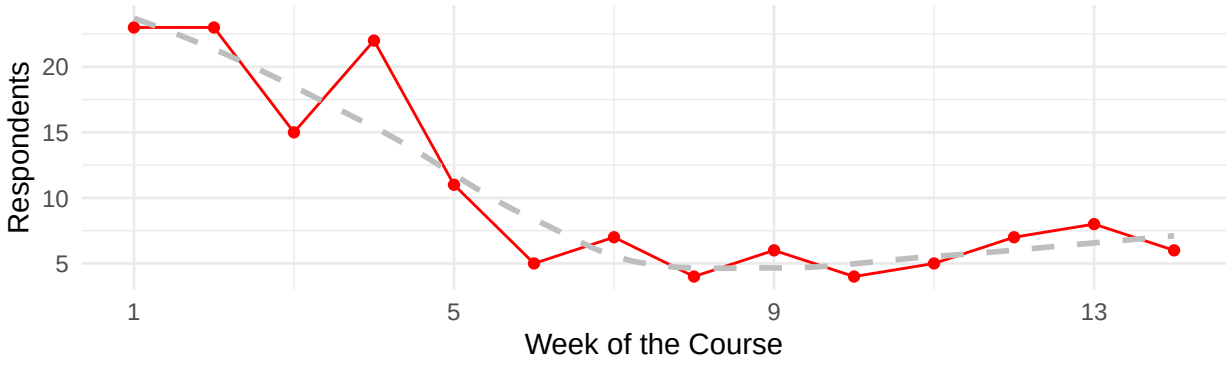

Figure 3: Respondents per Week of the Course

5 Reponses to Star-Ratings

The student were asked to provide star-ratings (1-5) to four questions. These were:

- *Claridad de la(s) lectura(s)* [Clarity of the readings]
- *Claridad de la presentación* [Clarity of the presentation]
- *Conocimentos previos* [Prior knowledge]
- *Calidad de la conectividad* [Connectivity]

The star-ratings in these categories are shown in Figure 4.

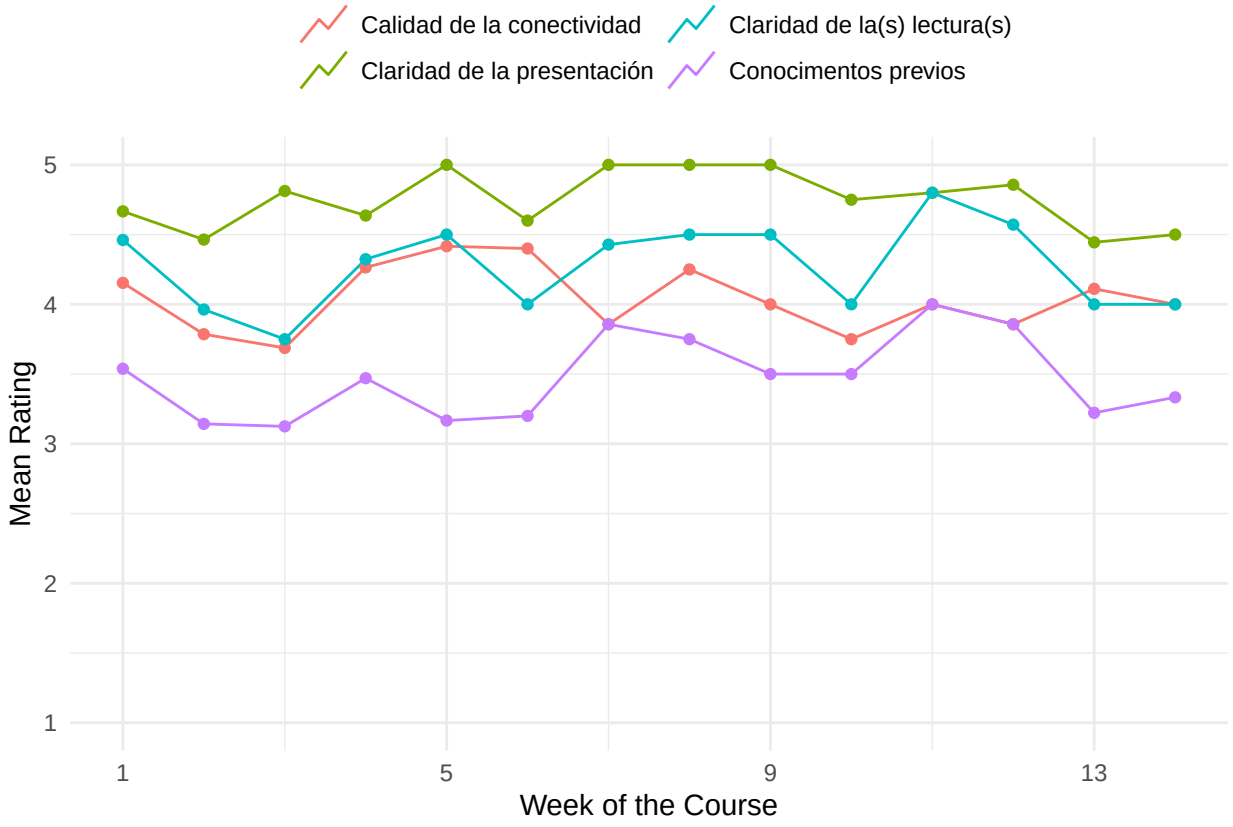

Figure 4: Average Star-Rating per Week

5.1 Real use of scale

While the students have five options to choose from when giving a star rating, it is not necessarily clear whether they in fact use the whole scale. Figure 5 shows the distribution of stars for each of the four star-rated questions used in the questionnaire.

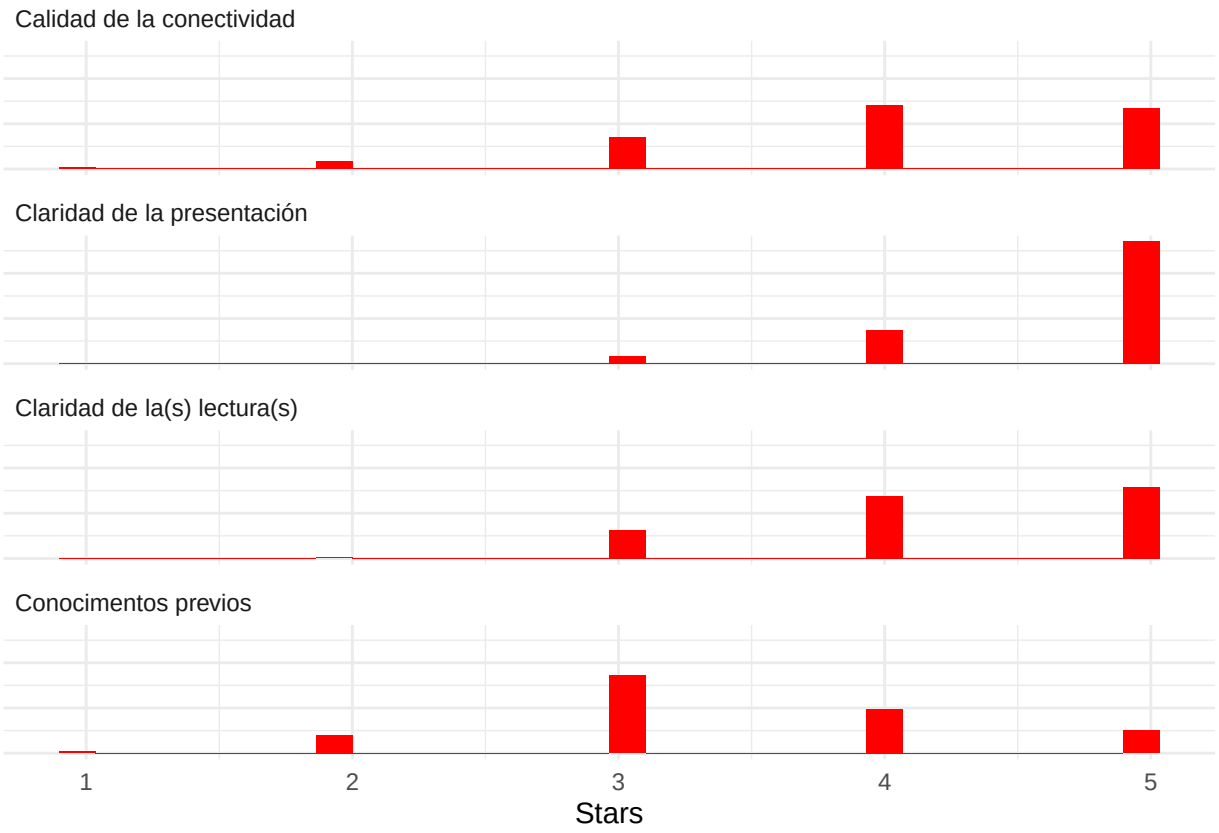

Figure 5: Comparison of Star Ratings

We see that the full scale of the star-ratings is only present in the answers to the question of prior knowledge.

6 Linguistic Analysis

The feedback from students also included two open-ended questions. These were:

- *Conceptos que aprendiste* [Concepts learned]
- *Conceptos que necesitás revisar* [Concepts for review]

The interface provided to the students allows for input of any length, i.e. the indivual concepts could be multiple words, (see Figure 1), separated by the key. Once enter was hit, the word or words were visually indicated to be of the same group. The interaction described is *standard* for this type of input on a mobile device.

The purpose of this question and the selected interface was to elicit key-terms for each category as this would facilitate automatization of the linguistic analysis. In practice, however, some proportion of the did not enter the data as expected. It is not clear whether this was because the field format was deemed inappropriate for the purpose, the instructions were unclear or due to lack of familiarity with this type of interface. A software update was made to the instructor app (Figure 2) to enhance the interpretability of the feedback, however, the researchers chose not to make any changes to the student interface.

Several different *feedback formats* were observed. While most students used the interface as intended (*Norm*), some chose not to answer the open-ended questions, some chose to submit a list, separated by commas and/or other connectors, and some chose a longer-form style of feedback. Table 1 summarizes these.

Except for the non-reply, which is a legitimate answer to any of the questions posed, the format of the feedback is significant to the type of processing that is needed to extract, summarize and analyze the linguistic

Table 1: Input Strategies Observed

		Format		
Question	N/A	Norm	Comma	Long form
Conceptos que aprendiste	41	72	36	17
Conceptos que necesitás revisar	66	48	33	19

data.

6.1 Number of Concepts Learned and Requested

We parsed the data using the appropriate technique depending on the input strategy used by the students. We then counted the number of concepts in all non-empty inputs across the fourteen weeks of the course. Figure 6 summarizes these results. We see that requests for review of concepts remained relatively stable throughout the course, with a mean of 1.4 and a standard deviation of 0.3, while the number of concepts learned show a significant increase in weeks 9-11. It is also worth noting that at no point during the course do the students on average report learning fewer concepts than those needing review.

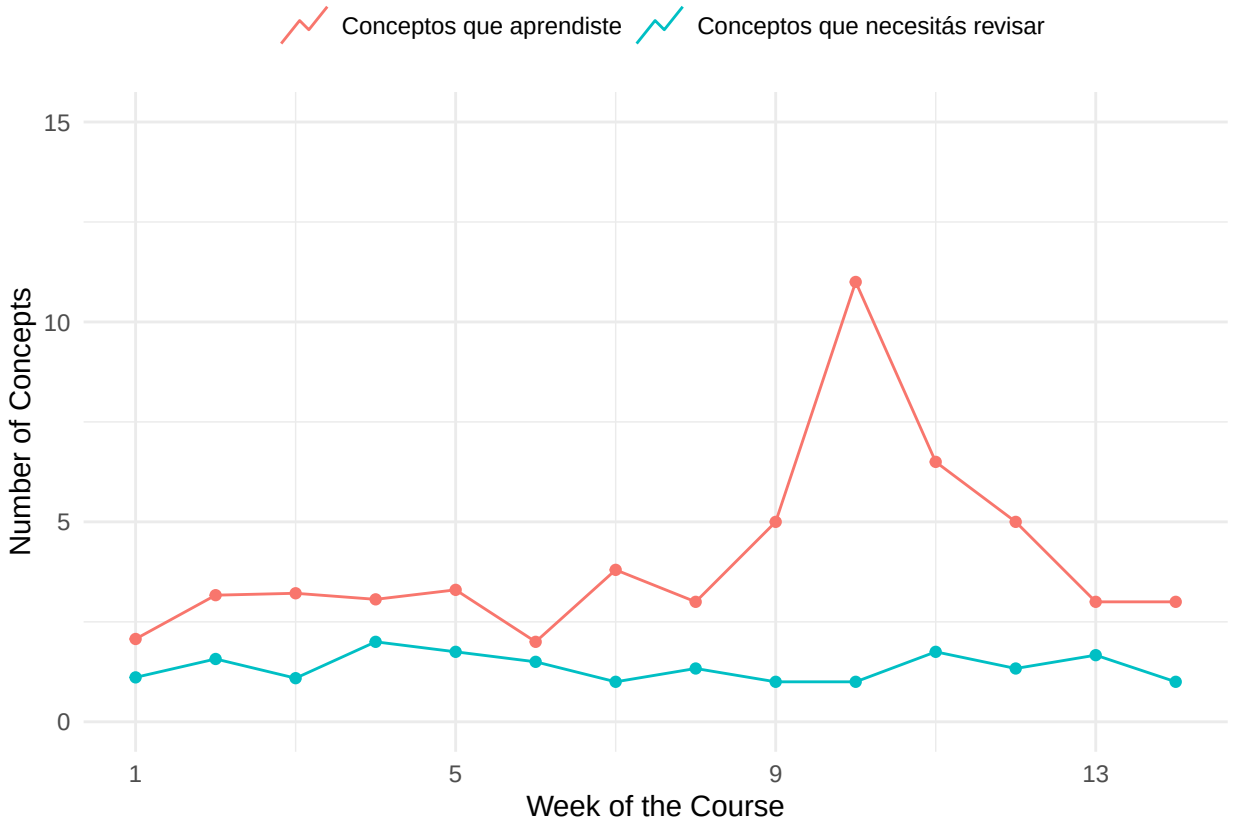

Figure 6: Concepts Input per Student Per Week of the Course

6.2 N-gram Analysis

N-gram analysis was performed (Silge and Robinson 2016) on the feedback data. The results are summarized in

Table 2: Reported Concepts Learned per Week

Week 1	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**	**Week 7**
agramatical	abstractas	aceptabilidad	adjetivo	adjetivos	categorías	aspecto
agramaticales	entidades	actuación	adjetivos	ambigüedad	deíctico	copulativos
amplio	gramática	claridad	ambigüedad	categorial	determinantes	formas
analizar	habla	competencia	categorial	clases	proformas	gramaticales
datos	lengua	estructura	categorías	clasificación	pronombres	léxicos
diferencia	paradigmáticas	gramática	funcionales	determinantes	repaso	ligero
gramatica	relaciones	lingüísticos	léxicas	pronombres	tipos	perífrasis
gramática	saussure	profunda	locuciones	referencia	transversales	personales
léxico	sistema	superficial	palabras	sustantivos		verbo
relaciones	valor	universales	sustantivos	transversales		verbos
Week 8	**Week 9**	**Week 10**	**Week 11**	**Week 12**	**Week 13**	**Week 14**
argumentos	actividad	abreviación	adjuntos	adjunto	adjetiva	admiten
clasificación	aspecto	alomorfo	arbitrario	adjuntos	adjetivas	concatenación
copulativos	aspectual	complementaria	constituyentes	agente	adverbial	declarativas
identificar	estado	criterios	diferencia	argumentos	adverbiales	funciones
inacusativos	léxico	definir	enunciado	complemento	compuestas	inclusión
inergativos	logro	derivados	oración	mínimos	coordinadas	indirecta
intransitivos	modal	distribución	pro	objetivo	oraciones	interrogativa
papeles	perífrasis	flexivos	semántico	obligatorio	subordinación	subordinada
semánticos	realización	lema	sintáctico	pares	subordinadas	subordinadas
verbos	temporoaspectual	lexema	sujeto	predicativo	yuxtapuestas	sustantivas

table 2 and table 3, which we have included for completeness, while recognizing tha they may be difficult to interpret without knowledge of the course curriculum in question. It was generally found that the concepts and topics that students reported having learned were in line with the instructors expectations and that the review requests were particularly useful to the instructor in organizing course. The lack of any (relevant) review requests for weeks seven, nine and ten are also related to the organization of the course, as evaluations were due around this time. Finally we note that in week thirteen several of the students chose to use the *request for feedback* field in the app to write thank you notes to the instructor and teaching assistants. This is yet another example of how the user is king when it comes to interacting with computer systems: they will use however they please, and ways that make sense to them, irregardless of the intent of the designer of the system.

References

Dietrichson, Aleksander, and Pablo Pagnone. 2020. *chi2Mobile: Chi2 Mobile*.

Granjon, David, Victor Perrier, and Isabelle Rudolf. 2020. *shinyMobile: Mobile Ready 'Shiny' Apps with Standalone Capabilities*.

Silge, Julia, and David Robinson. 2016. "Tidytext: Text Mining and Analysis Using Tidy Data Principles in r." *JOSS* 1 (3). https://doi.org/10.21105/joss.00037.

Table 3: Requests for Review

Week 1	**Week 2**	**Week 3**	**Week 4**	**Week 5**	**Week 6**	**Week 7**
asociativas	abordaje	adecuacion	aceptabilidad	adjetivos	ambiguedad	
relaciones	aceptabilidad	adecuación	adjetivos	adverbios	diacrítico	
sintagmáticas	chomsky	descriptiva	adverbiales	clases	estructural	
verbos	concretas	estructura	adverbios	concepto	léxica	
	contexto	expicativa	agramaticalidad	diferentes	semántica	
	cuales	profunda	ambigüedad	lexicalidad		
	cultura	superficial	criterios	palabra		
	gramática		diferencias	problema		
	halliday		djetivos	proformas		
	metafunciones		estructuras	reclasificacion		
Week 8	**Week 9**	**Week 10**	**Week 11**	**Week 12**	**Week 13**	
contexto			abrazo	contextual	abrazo	
cuesta			ceci	elipsis	ceci	
determinantes			contextual	gramatical	conjunción	
ejemplos			diferenciacion		encorchetamiento	
funcionan			elipisis		funciones	
gramaticales			elipsis		identificacion	
lexicos			enunciado		ninguno	
pronombres			funciones		oración	
reconocerlos			oración		practicar	
segun			practicar		subordinadas	