THE VALIDATION OF A QUESTIONNAIRE OF OMANI EFL COLLEGE STUDENTS' PERCEPTIONS OF A GRAMMATICAL INTONATION MODULE

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ABSTRACT

Guided by the ADDIE Instructional Design model, a 7-week online module was designed to enhance the grammatical intonation competency of foundation students at the University of Technology and Applied Sciences (Oman). The module was conducted with 35 level four foundation students, after which the researchers developed a questionnaire to investigate the sample students' perception of the effectiveness of the grammatical intonation module. This paper assessed the validation of the questionnaire using the experts' validity and the Rasch Model analysis of construct validity and reliability. The questionnaire investigates Omani EFL students' perceptions of a grammatical intonation module designed and applied to enhance their grammatical intonation competency. The sample of this study comprised 30 Omani EFL male and female non-major college students studying at the foundation program/the English language center/the University of Technology and Applied Sciences/Nizwa college. The experts validated the contents of the questionnaire. At the same time, the Rasch Model produced construct validity and reliability measurements using the dimensionality, item fit, and item polarity parameters and the person and item separation analysis. The study's findings indicated that the questionnaire is valid and reliable for measuring Omani EFL college students' perceptions of a grammatical intonation module.

Keywords: psychometric analysis, Rasch model, perceptions, grammatical intonation, module.

Introduction

Intonation is a supra-segmental feature (Anh-Thu,2018; Ladefoged and Johnson.,2015). It consists of patterns of pitch changes that occur in parts of the sentences we utter when we speak (Romero,2019). These changes in pitch patterns can convey different meanings for the same sentences (Seenak,2017).

Intonation has several functions, among which is the grammatical function. The grammatical function of intonation specifies the syntactic part played by a word or a phrase in the context of a specific clause or sentence (Zulfugarova, 2018). In English, the grammatical function of intonation shows a word's position in a sentence (Nagendra, 2018). This function could be employed to specify the grammatical structure; it has the same role that punctuation does in writing. It marks where a sentence starts and where it ends. Although the grammatical function of intonation is complex in teaching, it is essential for daily communication in which sentences that are potentially ambiguous in their spoken form as identified by grammatical intonation (Zulfugarova, 2018). The intonation patterns differentiate the syntactic structures and sentence types (statements vs. questions). For example, a rising contour assigns items preference to the falling one, often given with statements. Furthermore, intonation disambiguates miscellaneous grammatically ambiguous structures (Wells, 2006).

In retaining the importance of grammatical intonation in ELT, various instruments have been developed and used to assess the perception and production levels of English intonation of EFL learners during the past three decades (Hamarash,2018). Other instruments were developed to investigate the effectiveness of courses and programs for EFL intonation (Zulfugarova,2018). However, creating an instrument requires knowledge about the items' or questions' constructs, validity, and reliability of the instrument and its scores (Mofreh et al., 2020, 2018,2014). Instruments that include a rating scale are seen as a standard valid method for collecting data about specific types of educational, social, and behavioral constructs (DiStefano & Jiang, 2020). Although reliable results are obtained from the validation analysis using the conventional method, two critical issues come into view from the calculation. The first issue deals with applying an ordinal scale to explain the construct (Ma'ruf et al., 2016). DiStefano and Jiang (2020) stated that when validating a questionnaire, many researchers prefer to sum item responses to get a total score and indicate the construct of interest. This action is hard to give ground for the extent to which the summed scores fail to provide adequate consideration to items (Ibid.). Wright (1992, cited in Kreijns et al., 2020) added that the summed scores are not linear, and the interval of two consecutive total scores may not be equal. This inequality has resulted in short gaps in the data. The second issue concerns the failure of the validation method to investigate the sample's ability level and to explore the single latent construct (Ibid.). Van Zile-Tamsen (2017) assumed that the conventional method includes restricted opportunity to address the role of individual items and assess the items' effectiveness regarding the target population and their contribution to the evaluation of the entire latent construct.

Concerning the above discussion, previous literature (Thakur, 2020; Al Yaqoobi et al.; AL-Mahrooqi, 2018; Hamarash et al., 2018; 2016; AL-Abri, 2016; Al-Humaidi et al., 2014; Al Dilaimy, 2012), concluded that Omani EFL college students suffer from noticeable grammatical intonation deviations and deficiency. They are in dire need of remedial work to boost their grammatical intonation competency. Hence, the researchers developed a questionnaire to assess Omani EFL students' perceptions of a grammatical intonation module (SQPGIM) designed and applied to enhance their grammatical intonation competency. This study also intends to validate the (SQPGIM) by employing the experts' validity and the Rasch Model analysis of construct validity and reliability.

Objectives of the Study

Thus, this study aims to:

- Apply experts' validity to examine the content validity of the SQPGIM as an instrument used to explore Omani EFL students' perceptions of a grammatical intonation module.

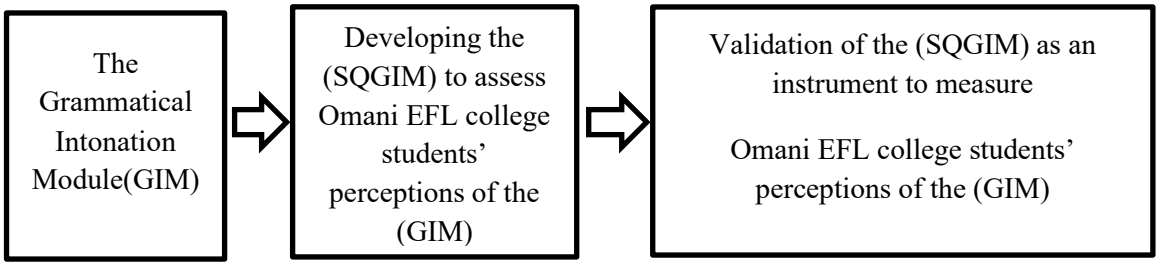
- Use the. RM analysis is a powerful tool for assessing the construct validity and reliability of the SQPGIM to validate it as an instrument.

However, the research questions of this paper are:

- To what extent does the experts' validity validate the SQPGIM?
- Do the items of the SQPGIM have adequate fit statistics, showing that each item relates to the variable and measurement tool in a meaningful way?
- Does the SQPGIM scale demonstrate high separation and good reliability in person and item sets?

The conceptual framework of this research, as shown in figure 1, presents the proposed relationships between grammatical intonation as an independent variable and the development of the (SQPGIM) as the dependent variable. The use of Rasch model analysis as a validation tool is suggested to achieve the validity and reliability of the (SQGIM)(Mofreh et al., 2020, 2018,2014).

Figure 1 Research Framework



Literature Review

The current study examines the psychometric characteristics of a questionnaire that investigates Omani EFL students' perceptions of a grammatical intonation module. (SQPGIM). To this end, it is critical to shed some light on the psychometric characteristics of the Rasch Model and comprehend the concept of grammatical intonation and its application in English language teaching.

Rasch Model Analysis as a Validation Tool

Rasch model is a psychometric model for testing categorical data, such as answering questions on an assessment or questionnaire responses. Thus, the Rasch model is used to analyze the data from instruments to measure the variables that are not measured directly, such as the characteristics of ability, attitude, and personality. In the Rasch Model, the probability of a specified response (e.g., right/wrong answer) is modeled as a function of person and item parameters (Bond & Fox, 2007). Rasch model analysis is a powerful tool for evaluating construct validity.

The most common practice in scale development consists of administering a group of items intended to measure the same construct and subsequently aggregating the responses to form a total scale value. (Mofreh,2014). These items should be equally weighted in the summation and treated as if they fall on an interval scale (Kindlon et al., 1996) to ensure that all items are equally important in assessing the construct. Moreover, reliability of scores, number of underlying constructs, and scale construction practices must empirically evaluate the assumptions of equal-item weighting. Rasch Model (RM) is a model that acts for the structure which data should exhibit to obtain measurements; i.e., it provides a criterion for precise measurement (Bond & Fox, 2007).RM analysis is a powerful tool for evaluating construct validity and reliability. Rasch fit statistics indicate the construct measures irrelevant variance, and the gaps on the Rasch item-person map are indications of construct under-representation.

There are essential aspects of RM measurement that were considered to understand the interpretations of the analysis of its results:

Validity

According to Rasch Measurement Model, the questionnaire validity refers to analyzing the output. The primary output is the polarity item as a measurement point correlation coefficient, known as the point-measure correlation coefficient (PTMEA Corr). The item polarity is also the early detection of construct validity (Bond & Fox, 2007).

Item Polarity

It means that the consistency of the items is an indicator used to show the items move in one direction to which the constructs are being measured. A positive indicator shows that all things are moving parallel to measure the constructs formed. (Linacre, 2003). Item polarity or point measure correlation (PTMEA Corr.) in the early detection of construct validity (Bond & Fox, 2007).

Dimensionality

Dimensionality aspects are essential for determining whether the instrument was measured in one direction and one dimension (Linacre, 2003; Bond & Fox, 2007; Wu & Adams, 2007). Dimensionality refers to the forcing on one attribute or dimension at a time. The dimensionality criteria exceed 40 % (Linacre, 2003; Bond & Fox, 2007).

Rating Scale Analysis

One of the significant aspects of RM is determining the probability of participant responses equally spread between the scales. RM can differentiate among scales of an instrument based on data gathered. (Linacre, 2003; Bond & Fox, 2007). Not all scales can be used for RM. If the structure calibration is less than 1.40 and more than five, this scale should be collapsed (Linacre, 2003; Bond & Fox, 2007).

Reliability

Item reliability indicates that the items will behave similarly even when given to a different sample. Person reliability refers to the consistency of person ordering that can be accepted if this sample of persons were given a parallel set of items measuring the same construct (Wright & Masters in Samah, 2014). The accepting criteria in the Rasch model exceed 0.50 (Bond & Fox, 2007)

Item separation

Item separation indicates that all participants can answer all items' difficulty levels. That means the participants can be separated based on measured constructs. The criterion for the usefulness of an instrument is exceeding its item separation (Linacre, 2007).

Item and Person Reliability

Item and person reliability will refer to the consistency of item placement along the pathway if these items give another sample of the same size that behaved the same way. Person reliability, on the other hand, refers to the consistency of person ordering that could be accepted if this sample of persons were given a parallel set of items measuring the same construct (Linacre, 2007; Bond & Fox, 2007).

Infit and Misfit

Infit refers to the degree of fit of an item or a person. Infit means square is the transformation of the residuals, the difference between the predicted and observed for easy interoperation. Its expected value is 1. As a rule of thumb, values between 0.70 and 1.30 are generally acceptable. Values greater than 1.30 are misfitting, and those less than 0.70 are overfitting (Bond & Fox, 2007). Another values suggested by Linacare (2005) is $0.5 < x < 1.5$.

Grammatical Intonation

Intonation is a remarkable characteristic of spoken language. It contains a continuous pitch change and a variation of a speaker's voice to convey meaning (Asghar,2013, Cardinali,2018 Bataineh et al., 2020). Intonation has many functions, such as grammatical, discourse, attitudinal, accentual functions, etc. Zulfugarova (2018) stated that intonation's grammatical part could help identify grammatical structure in speech. It performs a role similar to punctuation in writing. It can also identify clause and sentence units and contrasts questions/statements. Roach (2008) added that grammatical intonation helps language speakers and learners to realize the grammar and syntactic structures, e.g., boundaries between phrases, clauses, and sentences. It also clarifies the differences between questions and statements, the intricacies of grammatical subordination, grammatical intonation, and its relation to grammatical mood (question/statement, etc.) and modality (possibility, validity, etc.). Grammatical intonation is a function employed by English intonation to give the various grammatical structures their melody and impact on the flow of speech. It is related to the phenomena of intonation, such as tense, number, mood, and disambiguation of sentences (Roach,2009). The grammatical forms of the utterances highly influence intonation as speakers tend, mainly by tone, to use intonation to tell apart clause sorts, like question vs. statement, and to clear up numerous grammatically ambiguous structures (the syntactical function) (Naranjo,2020).

Methodology

This study is a pilot study that aims to test the validity and reliability of the SQPGIM questionnaire. The SQPGIM was developed to investigate Omani EFL college students' perceptions of the worthiness of training intervention sessions in the form of a grammatical intonation module. The sample was given a consent form to sign to guarantee their voluntary participation and withdrawal from the pilot study. The sample of this pilot study was 30 male and female Omani EFL non-major college students (n=20) who were studying at the foundation program/the English language center/the University of Technology and Applied Sciences/Nizwa college. The current study adopted the purposive sampling technique, a non-probability technique (Taherdoost, 2016). This sampling method requires researchers to have prior knowledge about the purpose of their research so that they can appropriately select and approach eligible participants.

The sample group has first been exposed to the' grammatical intonation module' for seven weeks of 3 sessions a week, i.e., 21 sessions of intonation training and patterns production

of grammatical intonation in which they were trained to produce the intonation patterns of Yes/No questions, WH questions, tag questions, favorable sentences, negative sentences, exclamatory sentences, and imperative sentences. Then, the sample was given the SQPGIM and requested to respond to all of its items. The researchers conducted the students' questionnaire SQPGIM face-to-face with the participants after exposing them to eight sessions of the grammatical intonation module. In this study, experts' validity was employed to obtain the content validity of the SQPGIM. In addition, the Rasch analysis measures the construct validity and reliability of the items of the students' questionnaire SQPGIM.

The Questionnaire of Students' Perceptions of a Grammatical Intonation Module (SQPGIM)

The students' questionnaire SQPGIM was developed to investigate Omani EFL college students' perceptions of the 'grammatical intonation module-GIM'. The GIM involved episodes of sitcoms as training material to create Omani EFL college students' grammatical intonation production of Yes/No questions, WH questions, tag questions, favorable sentences, negative sentences, exclamatory sentences, and imperative sentences. The items of the SQPGIM focused on asking the students if they thought the training intervention improved their production of grammatical intonation of each of the mentioned grammatical structures and if they found the training valuable and motivated. The SQPGIM was adopted from Park (2001) and adapted to match the current study's goals and procedures. Students illustrated their perceptions of the effect of the training intervention. It was developed following ADDIE instructional design steps as analyze, design, develop, implement, and evaluate.

Table1: Specification table of the items of the students' questionnaire

Function	Item	Resources
Intonation exposure	1, 2, 3 & 4	Roach, 2002; Park, 2011; Ahmed, 2005; Hamid, 2018; Hamarish et al., 2018.
Module sessions	5, 6, 7, 8, 9, &10	Roach 2002; Park, 2011; Ahmed, 2005; Hamid, 2018; Hamarish et al., 2018.
Improvement of intonation patterns' production	11, 12, 13, 14, 15, 16, 17, 18 &19	Roach 2002; Park, 2011; Ahmed, 2005; Hamid, 2018; Hamarish et al., 2018.
Follow-up tasks effects	20,21&22	Roach 2002; Park, 2011; Ahmed, 2005; Hamid, 2018; Hamarish et al., 2018.
Feedback sufficiency	23	Roach 2002; Park, 2011; Ahmed, 2005; Hamid, 2018; Hamarish et al., 2018.
Training adequacy	24 &25	Roach 2002; Park, 2011; Ahmed, 2005; Hamid, 2018; Hamarish et al., 2018.

The SQPGIM consists of 24 items employed to assess six constructs (intonation exposure, module sessions, improvement of intonation production, follow-up task effects, feedback sufficiency, and training adequacy). Table (1) shows the specifications adopted in the construct of the grammatical intonation module as an initial step to ensure content validity.

The Validity of the SQPGIM

Heale et al. (2015) explained the term 'validity 'as the extent to which the instrument measures what it is intended to measure. However, in this study, content or experts' and

construct validity were assessed. The students' questionnaire SQPGIM was pilot tested for experts' validity and the Rasch model analysis of construct validity and reliability to reach its final version administered to the sample students. The SQPGIM was developed based on the standard criteria for RM analysis.

The Experts' Validity

In answering the research questions of the current study, it is essential first to achieve the content validity of the SQPGIM that explores Omani EFL college students' perceptions of the grammatical intonation module. The (SQPGIM) was given to a group of specialists in Linguistics, Phonetics, Testing, English literature, and ELT to obtain their experts' validation and approval. The experts pointed out that the questionnaire items must shed light on Omani EFL college students' grammatical intonation intelligibility rather than accuracy (see appendix 7). The content validity index computed experts' approval before the (SQPGIM) was pilot tested for construct validity and reliability to reach its final version administered to the sample students. The experts were asked to give their opinions, modifications, or any addition to the (SQPGIM). This selected group of specialists has long years of experience teaching English at the university level in Oman, which makes them able to professionally examine the research instruments (Appendix 7 shows a list of members).

The experts' comments were mainly on the clarity of the (SQPGIM) in terms of language structure and vocabulary. One expert suggested the possibility of adding the acoustic-phonetic analysis in the (SQPGIM) used in assessing the '7-week online module'. However, other specialists did not highlight this point. Thus, the researchers did not consider it. Five experts removed one item of the(SQPGIM) as it was judged invalid. They indicate that it did not match the objectives of the current study.

The Rasch Model Analysis of the SQPGIM

Construct Validity

Quantitative data of the SQPGIM was analyzed using Rasch model analysis (Winsteps version 3.68.2) to test the questionnaire items' validity. Item polarity or point measure correlation (PTMEA Corr.) is an early detector of construct validity (Mofreh,2014; Bond and Fox, 2007). The analysis of the appropriateness and inappropriate items of the questionnaire was reformed using constructs one by one. Item measure can list the logit measurement information for each item.

The Reliability

To achieve the aims of this study, Person and Item reliability were tested using the criteria of the Rasch Model analysis (Mofreh,2014). Thus, the consistency of item placement can prove if these items are to be given to another sample of the same size that behaved the same way and could be accepted if this sample of persons were given a parallel set of items measuring the same construct (Linacre, 2007; Bond & Fox, 2007).

The Findings

Validity Analysis

The SQPGIM was judged valid by the experts by using the percentage of agreement, which means 100% agreement. The researchers modified the SQPGIM according to the expert's comments. The content validity index computes experts' approval. RM analysis was applied to test the construct validity of the SQPGIM. The RM analyses were based on dimensionality, item polarity, item fit, calibration scales, and psychometric properties criteria. Appendix 2 shows a good item correlation and item fit for the questionnaires. These findings signified that all the items were appropriate for further statistical analysis and inference. The MNSQ for all items does not exceed two or less than 0.4, the (ZSTD)value of item 22 exceeds 2 to 2.5, and its CORR value is negative; thus, it must be deleted through its MNSQ value is within the range. In addition, the CORR of item 23 is negative. However, its MNSQ and Zstd values are within the field.

The dimension of the SQPGIM's constructs was detected using dimensionality analysis of RM. The significance of 'Dimensionality' is in determining that the instrument was measured in one direction and one dimension (Mofreh,2014; Bond & Fox, 2007). In Rasch analysis, a good dimensionality is determined by natural variance explained by measures which should be more than 40% and unexplained variance in 1st contrast, which should be ≤ 15. Appendix 2 shows raw variance explained by measures is 32.1%, and the unexplained variance in 1st contrast was 10.6 %. Thus, dimensionality data results indicate that the students' questionnaire SQPGIM data fits the RM, as illustrated in appendices 2& 3.

A scale of five categories was used for the students" questionnaire that contained 1-Strongly agree,2= agree,3= neutral, 4=disagree, and 5=strongly disagree. In the column arrangement observation, (observed count) showed the respondents' answers given to the ranking scale. The most frequent response was the scale of respondents ranking 1 (15 %). The next grading scale that respondents selected was scale 3 (7%). Scale 4 had (4%) respondents, while the least grading scale of least were scales 2 and 5 with 9(2%) respondents. The observed averages showed the pattern of respondents. A reasonably regular pattern is expected with a systematic instrument from negative to positive through different values. There are no too difficult or too easy items for the item map analysis. All items are within the medium range.

Reliability Analysis

Reliability analysis was calculated and conducted following the RM analysis with 24 items for the SQPGIM questionnaire among 30 Omani EFL college students. The criteria for accepting reliability in RM exceeds 0.50 (Mofreh, 2014; Linacre, 2007; Bond and Fox, 2007). In addition, acceptable separation should be more than 2 (Fisher, 2007). The RM analysis measures the reliability and separation of items and persons. This statistic indicated the capability of the items to separate persons with different levels of the concept measured. The person reliability value is .69, and the person separation is 1.50, meaning that it is one separation level and the questionnaire takers were from the same homogenous group. It also showed that the item reliability value is 90, which is high, and the item separation value is three, meaning that items have various factors to

measure. Therefore, the results of person and item reliability and person and item separation for the students' questionnaire illustrated good readability. Analysis of the study showed the reliability of 30 respondents with 24 items in these constructs was high. Thus, the reliability of item and person for students' questionnaire values were reasonably close, representing a solid acceptable level.

Shedding light on the pilot study results, it is clear that the SQPGIM is valid and reliable, and its dimensionality is, to some extent, acceptable. The item map indicates that all of the questionnaire's items are within the same range of difficulty. However, the item fit analysis illustrates that item 22 must be deleted, and this, to the best of the researchers' knowledge, might be because the vocabulary used in the item is difficult for the sample of Omani EFL college students to comprehend. Thus, this item will not be deleted. Instead, the vocabulary used will be changed.

Chan and Subramaniam (2020) stated that the assessment of an item and person separation reliability needs to be performed in connection with the evaluation of the unidimensionality aspect of the Rasch model. This assessment indicates the potential reproducibility of item and person locations on the latent traits continuum (Chan & Subramaniam, 2020; Colledani et al., 2020).

The analysis of Rasch reliability resulted that the SQPGIM scale and subscales had a very high level of internal consistency ($\alpha \geq .90$) (Cohen et al., 2018). In other words, the person-level reliability of the SQPGIM scale and subscale maintains a sufficient level of generalizability of the measurement to new samples (Van Zile-Tamsen, 2017). Besides, item separation was viewed to have a high level of reliability for the subscales. The SQPGIM global scale and subscales have a high level of person separation reliability. Regarding the separation indexes, the item and person separation index values indicated sufficiency (Kreijns et al., 2020). The person separation values also suggest that the SQPGIM scale and subscales could distinguish between the high and lower performance of the responding person sample (Linacre, 2018).

Data Tabulation

The data obtained from the pilot study was converted into an Excel file and coded. Information related to the participants' identities was kept anonymous. The raw data then was converted into logits (or log-odds unit) scores (Yu, 2020, p. 56). Colledani et al. (2020) mentioned that the conversion enables the Rasch model to obtain measurement units at the same interval size, and the length between any two measures will be meaningful. The current study converted raw data into logit values using a WINSTEP application.

Assessment of Uni-Dimensionality

The assumption of Rasch analysis that deals with the uni-dimensionality characteristic of a measure viewed a measure as unidimensional for its ability to measure a single construct or concept (Yu, 2020). The SQPGIM uni-dimensionality aspect was assessed by evaluating the Principle Component Analysis (PCA) of residuals for the broad scale of SQPGIM and each sub-scale. PCA evaluation is intended to specify a particular association pattern among the SQPGIM constructs and identify the number of components that explain the maximum

variance in the data (Colledani et al., 2020). These findings indicate that SQPGIM fits the Rasch model, providing statistical evidence of a uni-dimensionality measurement of the scales for both the global scale and the subscales. In other words, the SQPGIM primarily measures Omani EFL students' perceptions of a grammatical intonation module. The SQPGIM subscales mainly measured the intonation exposure, module sessions, improvement of intonation patterns' production, follow-up task effects, feedback efficiency, and training adequacy.

Discussion

The SQPGIM is an instrument developed to investigate Omani EFL college students' perceptions of a grammatical intonation module GIM. The GIM aims to enhance its production of the intonation patterns used in producing seven English grammatical structures. To validate the SQPGIM, expert and content validity and person and item reliability were employed. The experts' rationality is essential when validating the contents of instruments to obtain successful measurement (Norhayati,2021). In addition, assessing the psychometric properties is critical for instruments as reliable and valid measurement tools (Mofreh, 2020). Thus, analyzing the psychometric properties of a scale enables its location and modification for use in the local context. This paper attempts to validate SQPGIM as an instrument. The items of the SQPGIM were identified according to theory and evaluated according to the Rasch Measurement Model using Winsteps software. As a psychometric study, this study intended to validate the SQPGIM as an instrument.

Based on the results obtained, the SQPGIM proves to be valid and reliable and employed as an instrument that assesses Omani EFL college students' perceptions of the GIM. Rasch analysis results indicated that the SQPGIM showed good overall fit, item fit, targeting, and internal consistency. Therefore, all items had ordered thresholds, no response dependence, unidimensional items, and no evidence of differential item functioning. The current study supports the conclusion of Norhayati et al. (2021), Mofreh et al. (2020), Hugquist (2017), and Shea (2009). It showed that the experts' validity is an effective procedure through giving the instrument to a group of experts for assessment and improvement. The Rasch model analysis is sufficient in measuring the items of scales of perceptions, attitudes, or abilities. They show the probability of an individual getting a correct response on a test item. The Rasch model is more straightforward and more intuitive than many other models. It resembles a ruler in which the scale is measured with "items." Less complicated items are to the left, and more complicated items are to the right.

Conclusions

The questionnaire of students' perceptions of the grammatical intonation model (QSPGIM) is pilot tested among Omani EFL college students. The selected students are studying in the foundation program. They are found valid after trying for the experts' validity and the RM analysis of construct validity of item fit statistics, dimensionality, and polarity to confirm their validity. Moreover, the RM analysis obtained the reliability of the SQPGIM by examining the person and item reliability, and the SQPGIM was found reliable. However,

there were limitations to the current study. The targeting of the sample was less than desirable due to the current covid-19 pandemic's physical limitations. A recommendation is for further research as more research is necessary on the practical application of the students' perceptions questionnaire SQPGIM. To the best of the researchers' knowledge, the development and validation of the SQPGIM were not reported elsewhere, suggesting a valuable contribution of the current study to the literature.

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Appendix1
The Students' Questionnaire

Dear student,
Kindly read the below statements and tick the option that mainly reflects your opinion.

Statements	Options				
	1 Strongly agree	2 agree	3 Neutral	4 Disagree	5 Strongly disagree
1-Through the training sessions, I learned how to produce the patterns of grammatical intonation by watching the videos.					
2- Through the training sessions, I learned how to produce the patterns of grammatical intonation by listening to the dialogues of the episodes.					
3- Through the training sessions, I learned how to produce the patterns of grammatical intonation by reading the scripts.					
4- Through the training sessions, I learned how to produce the patterns of grammatical intonation by taking the follow-up tasks					
5- I found the training sessions helpful.					
6- I found the training sessions technically easy to access.					
7- I found the training sessions interesting.					
8- I found the training sessions systematically arranged.					
9- I found the training sessions motivating.					
10-I found the training sessions clear.					
11- The training sessions helped me to understand what is meant by grammatical intonation.					
12-The training sessions helped me produce the Wh questions with the correct intonation patterns.					
13-The training sessions helped me produce the Yes/No questions with the correct intonation patterns.					
14-The training sessions helped me produce the tag questions with the correct intonation patterns.					
15-The training sessions helped me produce positive sentences with the correct intonation pattern.					
16- The training sessions helped me produce negative sentences with the correct intonation pattern.					
17- The training sessions helped me produce the imperative sentences with the correct intonation pattern.					

18- The training sessions helped me produce exclamatory sentences with the correct intonation pattern.					
19- The 'role-play' task helps comprehend and produce the correct patterns of grammatical intonation.					
20-The 'read aloud' task helps comprehend and produce the correct patterns of grammatical intonation.					
21-The 'select' task helps comprehend and produce the correct patterns of grammatical intonation.					
22- The types of feedback given me during the training sessions were adequate.					
23-The training was enough to train me to recognize the various grammatical intonation patterns.					
24-The training was enough to train me to produce the various grammatical intonation patterns.					

Appendix 2

Item Polarity and Item Fit analysis

TABLE 10.1 C:\Users\e315156.NCT\Downloads\questio ZOU234WS.TXT Jun 30 11:54 2021
INPUT: 30 PERSONS 26 ITEMS MEASURED: 30 PERSONS 26 ITEMS 129 CATS 3.68.2

PERSON: REAL SEP.: 1.46 REL.: .68 ... ITEM: REAL SEP.: 1.52 REL.: .70

ITEM STATISTICS: MISFIT ORDER

ENTRY NUMBER	TOTAL SCORE	COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PT-MEASURE CORR.	PT-MEASURE EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	ITEM	G
22	90	30	-.22	.14	1.48	2.3	1.56	2.5	A	-.23	.36	20.0	25.6	CR21_A	0
9	89	30	-.18	.14	1.33	1.7	1.32	1.6	B	.00	.36	20.0	25.0	CR9	0
23	82	30	-.25	.16	1.28	1.3	1.26	1.1	C	-.07	.31	26.7	32.8	CR22	0
24	93	30	-.34	.14	1.21	1.1	1.26	1.3	D	.12	.37	16.7	24.4	CR23	0
19	71	30	.25	.14	1.18	1.0	1.17	.9	E	.12	.34	16.7	17.9	CR19	0
25	84	30	-.08	.19	1.15	.8	1.17	.8	F	.02	.28	16.7	28.0	CR24	0
10	81	30	-.19	.16	1.16	.8	1.14	.7	G	.15	.32	30.0	31.6	CR10	0
11	91	30	-.30	.13	1.04	.3	1.04	.3	H	.34	.38	26.7	22.9	CR11	0
6	70	30	.27	.14	1.04	.3	.99	.0	I	.32	.35	23.3	15.9	CR6	0
12	83	30	.02	.18	1.02	.2	1.02	.2	J	.27	.29	20.0	27.3	CR12	0
7	79	30	-.09	.14	1.01	.1	1.00	.1	K	.35	.35	33.3	26.8	CR7	0
20	81	30	-.12	.14	.92	-.3	.96	-.1	L	.43	.35	26.7	28.0	CR20	0
18	62	30	.45	.16	.96	-.1	.93	-.2	M	.34	.30	20.0	28.0	CR18	0
17	66	30	.20	.14	.95	-.1	.88	-.4	m	.41	.33	23.3	17.5	CR17	0
16	72	30	.21	.15	.94	-.3	.95	-.2	l	.38	.33	10.0	22.6	CR16	0
13	89	30	-.26	.16	.92	-.3	.94	-.2	k	.44	.33	40.0	31.0	CR13	0
5	58	30	.20	.18	.94	-.2	.91	-.3	j	.38	.27	33.3	28.5	CR5	0
26	91	30	-.34	.16	.92	-.3	.91	-.4	i	.43	.31	40.0	33.7	CR25	0

Appendix 3

The Item Dimensionality Analysis

INPUT: 30 PERSONS 35 ITEMS MEASURED: 30 PERSONS 33 ITEMS 147 CATS 3.68.2

Table of STANDARDIZED RESIDUAL variance (in Eigenvalue units)	Empirical	Modeled
Total raw variance in observations	40.7 100.0%	100.0%
Raw variance explained by measures	7.7 18.8%	18.6%
Raw variance explained by persons	7 1.7%	1.7%
Raw variance explained by items	70.17 1%	16.9%
Raw unexplained variance (total)	33.0 81.2% 100.0%	81.4%
Unexplained variance in 1st contrast	3.8 9.4%	11.6%

Appendix 4

Item-Scale Analysis

CATEGORY OBSERVED- LABEL SCORE COUNT %	OBSVD SAMPLE AVRGE EXPECT	INFIT OUTFIT MNSQ MNSQ	CALIBRATION	CATEGORY MEASURE	
1 1 10 33	-.25 -.34|	1.13 1 .96	NONE	(-1.35)	1
2 2 6 20	-.35* -.25	.96 1.30	.24	-.53	2
3 3 3 7	-.18 -.19	.10 .06	.91	-.16	3
4 4 4 13	-.04 -.13	.92 1.23	-.82	.12	4
5 5 2 10	-.13* -.08	1.19 1.52	.21	.49	5
6 6 5 17	-.14* -.03	1.33 1.31	-.54	(1.28)	6

Appendix 5

The Reliability of the Questionnaire

PERSONS 30 INPUT 30 MEASURED INFIT OUTFIT |

REAL RMSE .17 ADJ.SD .25 SEPARATION 1.50 PERSON RELIABILITY .69

| REAL RMSE .35 ADJ.SD 1.05 SEPARATION 3.00 ITEM RELIABILITY .90|

Appendix 6

Item-map -Analysis

```
TABLE 12.2 C:\Users\Dell\Downloads\questionnaire  ZOU683WS.TXT Jul 27 14:48 2021

INPUT: 30 PERSONS  35 ITEMS  MEASURED: 30 PERSONS  33 ITEMS  147 CATS     3.68.2

--------------------------------------------------------------------------------


  PERSONS - MAP - ITEMS

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3        +

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2        +

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         | ST5    ST7

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1        +

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         | CR18

        T| CR1    CR14   CR15   CR2    CR4    CR6

       X | CR16   CR17   CR19   CR3    CR5

    XXXXX S| CR12

0     XXX  +M CR24   CR7    ST2
```

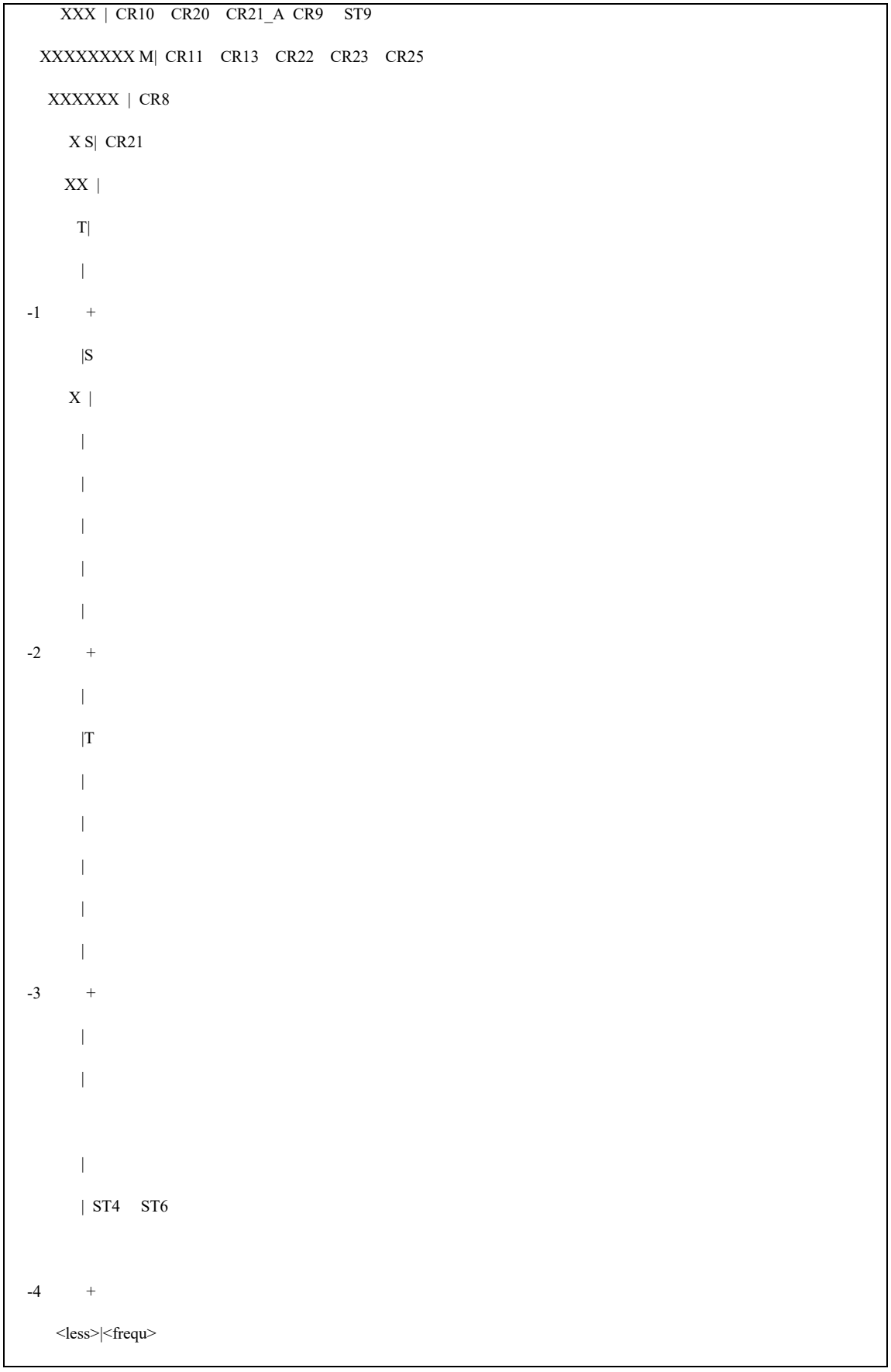
XXX | CR10 CR20 CR21_A CR9 ST9
XXXXXXXX M| CR11 CR13 CR22 CR23 CR25
XXXXXX | CR8
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Appendix 7

Experts' Comments on the Validity of SQPGIM

Expert	Validity	Comments
1-Prof.Bushra Mustafa	Valid	Include the acoustic-phonetic analysis in the SQPGIM.
2-Dr. Abdullah Alari	Valid	-
3-Dr. Rihana Khuzir	Valid	Try to use sentences and phrases that match students' academic level in terms of grammar structures and vocabulary.
4-Dr. Surya Vellank	Valid	Give students some time to read the questions before answering them questions.
6-Dr. Iman AL-Khalidy	Valid	-
7-Dr. Ourada Khouni	Valid	-
8-Mr. Ishaq AL-Naabi	Valid	Try to use sentences and phrases that match students' linguistic backgrounds.