

Comparative Analysis of Motivation of Different Language Learning Software

FINAL REPORT

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Executive Summary

This study was designed to compare the motivation level and attitude for three language learning software products: Rosetta Stone® (RS), Auralog (AU) and Berlitz (BR). The study utilizes three previously established and validated research instruments and multivariate scales for measuring motivation and attitude toward learning foreign language. The three scales also passed the test for internal reliability based on our sample. The sample was stratified using propensity score calculations of the participants' language ability. The analysis was based on a stratified representative sample of 234 participants who used one of the three software products for one full month.

The higher dropout rate of AU and BR users and their smaller initial sample sizes (N=50, due to financial reasons) lead to smaller sample size of the two groups and this limited the statistical power for the analysis in some cases.

The results are reported in two main directions; first, we report the overall direction of the effect sizes and, second, we report specific statistically significant differences. The importance falls primarily on the effect sizes findings because they are very consistent. Some of the tested differences were not statistically significant due to the smaller sample sizes. Nevertheless, since the effect sizes are in the same direction we can hypothesize that with a followup study with larger samples for the AU and BR groups, the results will be confirmed and statistical significance will be established for all differences.

MAIN DIRECTION OF EFFECT SIZES:

1. Before the study all three groups (RS, AU, BR) had the same level of motivation measured by the Academic Motivation Scale (AMS). After the study the RS users had the highest level of intrinsic and extrinsic motivation and attitude toward studying

foreign language. The RS group was the best performing group for all 6 subscales of the AMS scale.

2. After the study the RS users had the highest level of linguistic goals motivation. The RS group results were the best in 5 out of 6 subscales of the Intrinsic Motivation Inventory (IMI) scale.

3. After the study the RS users had the highest level of non-linguistic goals motivation. The RS group results were the best in 9 out of 12 subscales of the Attitude/Motivation Test Battery (AMTB).

4. After the study there were very few differences between the AU and BR groups. In general the AU users had slightly better results than the BR users.

5. After the study the RS users were very satisfied with the software with 90.2% ready to recommend the software to others who are interested in studying Spanish. The other two groups had considerably worse results with only 32.4% recommending AU and 44.4% recommending BR software.

SPECIFIC FINDINGS

Specific, statistically significant differences were found in the following areas.

- The RS group had better post experimental motivation than the BR group on “Intrinsic motivation - toward accomplishment” and “Extrinsic motivation – introjected.”
- The RS group had better motivation than the AU and BR groups on “Interest/Enjoyment” and “Perceived Competence” subscales. The RS group also had better motivation than AU group on “Perceived Choice.” This means that the RS software users were more interested and enjoyed the

process of learning foreign language more than the AU and BR groups did. The study participants in the RS group exhibited more perceived competence and were more satisfied with their performance at studying Spanish than the other two groups.

- The RS group had better results than the AU group on “Motivational Intensity”, “Spanish Course Anxiety” and “Spanish Use Anxiety”. This means that the RS software makes the users study more regularly (e.g. “almost every day”) than the AU, and the anxiety to study and use Spanish language is lower in the RS users compared to the AU users.
- There were two subscales for which the RS group performed better than both AU and BR. They were “Spanish Software Evaluation” and “Spanish Course Evaluation”. Both differences RS-AU and RS-BR were statistically significant. This means that the RS users evaluate very high the software product and the language course and this evaluation is higher than the AU and BR.
- The RS group had worse results than the BR group on “Parental Encouragement”. This means that in general the parents of the BR group were encouraging their children to learn foreign language more than the parents of the RS group participants.

We can conclude from this study that the research instruments and multidimensional scales worked well for the users of all three software products. The results are convincing that we could expect overall higher motivation and more positive attitude toward studying foreign language of the RS users in comparison with the AU and BR users. Additional research with more statistical power will be necessary to validate some of the results and to test for statistical significance of the differences.

Introduction

This study is designed to compare the motivation level of three different language learning software packages. It follows in the steps of another research study by the same research team¹. In the previous study we developed and tested the instrument for measuring the level of attitude and motivation for learning foreign language. In the current study, we explore the possibility of comparing the motivation power of different software products. One of the samples is the same sample used in the first study on motivation (RS sample). The other two samples were considerably smaller due to financial reasons and this limited considerably the statistical power of our analysis. The value

of this study is in estimation of the motivation level for three leading learning language software products and the estimation of the effect sizes, their direction, means and standard errors. This is invaluable information for future comparative motivation studies, and estimating the size of the sample.

The study was commissioned by Rosetta Stone[®] but the analysis was conducted independently by the research team. The study took part in April-June 2009.

The analysis is based on a sample of people who responded to an advertisement in Washington, DC area newspapers. To be eligible for the study respondents had to be between the ages of 18 and 65 and neither

native speakers of Spanish nor having advanced knowledge of Spanish.

The selected respondents were given the opportunity to use one of the three software products for one full month. The products were Rosetta Stone[®] Spanish Latin American online version (RS), Auralog[®] (AU) “Tell Me More” online product and Berlitz[®] (BR) Spanish premier, CD product. At the beginning and at the end of the study information was collected about the level of their motivation and attitude toward learning foreign language. There were incentives for the participants who completed the study. They received a 6 month free subscription for the Rosetta Stone[®] Spanish web version software and a bonus of \$100.

¹Vesselinov, R., J.Grego, B.Habing, A. Lutz, 2009: “Measuring the Attitude and Motivation of Rosetta Stone”.

Part 1. Methodology

SAMPLE

The original pool consisted of 4656 people who responded to a newspaper advertisement looking for participation in a Spanish language study. We had basic demographic information on everybody in the pool and we excluded from consideration people who were below the age of 18 or above 65, or were advanced or native speakers of Spanish.

We randomly selected 300 of the eligible respondents and invited them to participate in the study and required them to complete a new demographic survey, initial motivation measures and Spanish evaluation test. The study design was to allocate approximately 200 participants for RS, 50 for AU and 50 for BR.

In order to address the differences in language skills we performed a propensity scores matching and stratified the sample before assigning the people to the different samples. In the propensity score model the outcome variable was the participants' level of Spanish ability evaluated by the web-based test WebCAPE. The independent variables in the propensity score model were the major demographic characteristics: gender, age, race, education, employment (full time or not), spouse speaks Spanish (Yes/No), respondent knows some Spanish (Yes/No), knowledge of another foreign language (Yes/No), reason for studying Spanish (work, travel, other).

The predicted propensity scores were based on the regression model described in the previous paragraph. The whole sample (N=300) was stratified in 3 equal size clusters/strata (N=100 each): low, medium and high ability according to the predicted propensity scores. Then we randomly selected from each strata with equal intensity to constitute the samples for this study. The starting sample sizes were 200, 50 and 50 for RS, AU, BR respectively. Three more people, originally assigned to other groups, were added to the RS sample because they used Mac computers which were not compatible with the other products. Three new people were randomly selected from the pool to replace the ones moved to RS.

Since we had to work with a stratified sample we used the appropriate statistical methods to account for the complex sampling. We applied the stratified estimator (Cochran, 1977) in the SAS[®] software procedure PROC SURVEYMEANS (SAS OnlineDoc, SAS Help and Documentation). We performed pairwise comparison tests (RS vs AU, RS vs BR, AU vs BR) with Bonferroni correction for multiple comparison bias. The level of significance reported was unless otherwise specified.

Part of the analysis incorporates the use of difference scores (DS). DS are computed for variables for which there were two measurements – at the beginning and at the end

of the study. This is the case with one of the motivation scales which was administered once at the beginning of the study and once at the end of the study. DS are calculated as the difference between the value of the variable at the end of the study and the initial value of the variable. Negative values of DS would mean that the variable level has decreased during the study, and positive values would mean that the level has increased. Zero and close to zero values of DS would mean that the variable level during the study has not changed.

A useful tool in this analysis is the rank measure. The ranks are assigned instead of the actual values in order to simplify the understanding and determine the patterns in effect sizes. For example if the average level for the three groups (RS, AU, BR) are 300, 500, 150 respectively, these values are replaced with 2, 1, and 3. The ranks are interpreted simply as meaning that the first group is ranked as 2, the second group as rank 1, and the third group as rank 3 (1=Best or 1st place, 2=Middle or 2nd place, 3=Worst, or 3rd place). It is possible two or three groups to have the same rank if the mean values of the scale are the same. The interpretation of the patterns is much easier using ranks as opposed to their actual values. There is no statistical significance related to the ranks; they are meant to help establish common direction of the effect sizes.

SPANISH LANGUAGE EVALUATION TEST

In order to evaluate the level of Spanish skills and knowledge of the participants we used the WebCAPE test (Web-based Computer Adaptive Placement Exam) developed by the Perpetual Technology Group (<http://webcape.byuhtrsc.org>).

This is a well established² foreign language placement exam with good validity and reliability (test-retest = 0.86). According to their website, more than 500 colleges and universities use WebCAPE for language courses placement. Among them are Harvard University, Boston University, Vanderbilt

University, Brown University, Queens College, CUNY, University of South Carolina, Cornell University, etc.

The maximum score for Spanish achieved empirically for this adaptive test had been 956. The scores are usually a positive number but it is possible to get zero or negative score because of the weights on the questions. A negative score can be interpreted in the sense that the participant did not take the test seriously or that there were other obstacles because the test is adaptive and every question depends on the answer to the previous question. In that respect, preferably

negative scores should be set equal to zero.

WebCAPE creators suggest the following cutoff points for placement in a Spanish college course depending on the length of the course measured by number of semesters.

A student at a college with 6 semester Spanish course will need at least 204 points on WebCAPE to move or be placed in Semester 2. Respectively a student at a college with 5 semester Spanish course will need at least 234 points; with 4 semester Spanish course – at least 270 points, and with 3 semester courses – at least 281 points.

Table 1. Suggested Calibration Scores

WebCAPE Suggested Calibration Scores							
Spanish: (3) Courses		Spanish: (4) Courses		Spanish: (5) Courses		Spanish: (6) Courses	
Sem 1	Below 280	Sem 1	Below 270	Sem 1	Below 324	Sem 1	Below 204
Sem 2	218 - 351	Sem 2	270 - 345	Sem 2	234 - 311	Sem 2	204 - 288
Sem 3	Above 351	Sem 3	346 - 427	Sem 3	312 - 383	Sem 3	289 - 355
		Sem 4	Above 427	Sem 4	384 - 456	Sem 4	356 - 434
				Sem 5	Above 456	Sem 5	435 - 497
						Sem 6	Above 497

²Personal correspondence with Dr. Jerry Larson, Professor of Spanish Pedagogy, Brigham Young University.

MEASURING THE MOTIVATION AND ATTITUDE

In this study we used three different sets of scales.

SCALE 1: ACADEMIC MOTIVATION SCALE (AMS)

This scale was developed first by Vallerand et al (1992, 1993). It measures motivation to study a foreign language and contains 7 subscales assessing intrinsic motivation towards knowledge, accomplishments and stimulation, as well as external, introjected and identified regulation, and amotivation. It contains 28 items assessed on a 7-point Likert scale. The items are rated on a scale, ranging from 1 (does not correspond at all) to 7 (corresponds exactly). Each subscale consists of four items so the score can range from 4 to 28. It can also be averaged so the score is between 1 and 7 which makes the interpretation easier. A high score will indicate a high approval/support for that particular academic motivation. Subscales are related to intrinsic motivation (IM), extrinsic motivation (EM) and amotivation and are listed below.

IM-to-know.

IM is performing an activity for itself, and the pleasure and satisfaction derived from participation. IM-to-know "... relates to several constructs such as exploration, curiosity, learning goals, intrinsic intellectuality, and finally the IM to learn. Thus, IM-to know can be defined as the fact of

performing an activity for the pleasure and the satisfaction that one experiences while learning, exploring, as trying to understand something new. For instance, students are intrinsically motivated to know when they read a book for the sheer pleasure that they experience while learning something new" (Vallerand et al, 1992).

IM-to-accomplish.

"Individuals interact with the environment in order to feel competent, and to create unique accomplishments. ... Thus, IM-to-accomplish things can be defined as the fact of engaging in an activity for the pleasure and satisfaction experienced when one attempts to accomplish or create something. Students who extend their work beyond the requirements of a term paper in order to experience pleasure and satisfaction while attempting to surpass themselves display IM toward accomplishments" (Vallerand et al, 1992).

IM-to-experience stimulation.

"IM-to experience stimulation is operative when someone engages in an activity in order to experience stimulating sensations (e.g., sensory pleasure, aesthetic experiences, as well as fun and excitement) derived from one's engagement in the activity. Research on the dynamic and holistic sensation of flow, on feelings of excitement in IM, on aesthetic stimulating experiences, and peak experiences is representative of

this form of IM. Students who go to class in order to experience the excitement of a stimulating class discussion, or who read a book for the intense feelings of cognitive pleasure derived from passionate and exciting passages represent examples of individuals who are intrinsically motivated to experience stimulation in education" (Vallerand et al, 1992).

EM-identified

This type of motivation is external rather than internal. It is usually related to some other life goals like career success. One typical example is the following item: "Because I think that Spanish will help me better prepare for the career I have chosen."

EM-introjected

This subscale is related to other feelings of importance for life and career. A typical prompt is: "Because of the fact that when I succeed in studying I feel important."

EM – external regulation

This subscale is related to expectations for external guideline and directives, such as the following: "Because only with the language(s) I currently speak I would not find a high-paying job later on."

Amotivation

As the name shows it relates to the feeling opposite to motivation. A typical case is "Honestly, I don't know; I really feel that I am wasting my time studying Spanish"

SCALE 2. INTRINSIC MOTIVATION INVENTORY (IMI)

Scale Description³:

“The Intrinsic Motivation Inventory (IMI) is a multidimensional measurement device intended to assess participants’ subjective experience related to a target activity in laboratory experiments. It has been used in several experiments related to intrinsic motivation and self-regulation (e.g., Ryan, 1982; Ryan, Mims & Koestner, 1983; Plant & Ryan, 1985; Ryan, Connell, & Plant, 1990; Ryan, Koestner & Deci, 1991; Deci, Eghrari, Patrick, & Leone, 1994). The instrument assesses participants’ interest/enjoyment, perceived competence, effort, value/usefulness, felt pressure and tension, and perceived choice while performing a given activity, thus yielding six subscale scores. Recently, a seventh subscale has been added to tap the experiences of relatedness, although the validity of this subscale has yet to be established. The interest/enjoyment subscale is considered the self-report measure of intrinsic motivation; thus, although the overall questionnaire is called the Intrinsic Motivation Inventory, it is only the one subscale that assesses intrinsic motivation, per se. As a result, the interest/enjoyment subscale often has more items on it that do the other subscales. The perceived choice and perceived competence concepts are theorized

to be positive predictors of both self-report and behavioral measures of intrinsic motivation, and pressure/tension is theorized to be a negative predictor of intrinsic motivation. Effort is a separate variable that is relevant to some motivation questions, so is used as its relevant. The value/usefulness subscale is used in internalization studies (e.g., Deci et al, 1994), the idea being that people internalize and become self-regulating with respect to activities that they experience as useful or valuable for themselves. Finally, the relatedness subscale is used in studies having to do with interpersonal interactions, friendship formation, and so on.”

IMI has 37 items grouped in 6 subscales. Each item is evaluated by a 7-point Likert scale from 1 (“Not at all true”) to 7 (“Very true”). The subscale score can be computed by averaging the items scores so the total score will be between 1 and 7 and thus is easier to interpret. The subscales are as follows:

Interest/Enjoyment

The subscale measures the interest and enjoyment while studying a foreign language. A typical item is: “While I was studying Spanish, I was thinking about how much I enjoyed it.”

Perceived Competence

For learners of a foreign language, it is important to gain some confidence regarding their competence. A typical item is: “I am satisfied with my performance at studying Spanish.”

Effort/Importance

A substantial part of the motivation is related to the perception of importance of the task at hand. A typical item is: “It was important to me to do well at studying Spanish.”

Pressure/Tension

Undoubtedly the process of learning a foreign language is stressful and a certain amount of pressure and tension is inevitable. A typical item is: “I felt pressured while studying Spanish.”

Perceived Choice

Even though the respondents for this study volunteered it is still important to evaluate whether they felt free to decide whether to study or not to study Spanish. A typical item is: “I did study Spanish because I wanted to.”

Value/Usefulness

Last but not least, this subscale measures the value of learning a foreign language. A typical item is: “I believe studying Spanish could be beneficial to me.”

³ Source: University of Rochester: Self Determination Theory web page <http://www.psych.rochester.edu/SDT/>

SCALE 3. ATTITUDE/MOTIVATION TEST BATTERY (AMTB)

AMTB was developed by Gardner (1985). The version used in this study was adapted from the English-language version of the AMTB for use by students studying English as a foreign language.

Scale Definition⁴

“The goals of any second language program are partly linguistic and partly nonlinguistic. The linguistic goals focus on developing competence in the individual’s ability to read, write, speak and understand the second language, and there are many tests available with which to assess these skills. Non-linguistic goals emphasize such aspects as improved understanding of the other community, desire to continue studying the language, an interest in learning other languages, etc. Very few tests have been made available to assess these non-linguistic aspects.

The Attitude/Motivation Test Battery has been developed to fill this need. Its development follows more than 20 years of research...”

The scale has 104 questions defining 12 subscales. Each item requires an answer on a 6 point Likert scale ranging from 1 (Strongly Disagree) to 6 (Strongly agree). The total score for each subscale can be expressed as the average of the items’ scores and it will also range between 1 and 6. The subscales are as follows:

1. Interest in Foreign Languages

This interest is obviously very important in the overall evaluation of the motivation and attitude. The bigger the interest is the bigger the motivation. A typical example is, “I wish I could speak many foreign languages perfectly.”

2. Parental Encouragement

It is interesting to see what the role of parents was in the general orientation and attitudes towards learning a foreign language. A typical example is, “When I was in school, my

parents felt that it was very important for me to learn a foreign language.” For our sample this encouragement measurement may not be very closely related to the current situation because the average age is about 40 years of age but it is still valuable information.

3. Motivational Intensity

The understanding that foreign language is better studied every day or even more intensely is measured by this subscale. A typical example is, “I keep up to date with Spanish by working on it almost every day.”

4. Spanish Course Anxiety

Anxiety is typically present in all types of study not only language study. It may have a negative connotation in the sense that it is better to have lower level of anxiety rather than high level. A typical example is, “It worries me that other students who study Spanish as much as I do, may speak Spanish better than I do.”

5. Spanish Software Evaluation

This subscale is a validated measure for assessing the language learning software. A typical example is, “My Spanish software is a great source of inspiration to me.”

6. Attitudes toward Learning Spanish

Motivation can be obviously helped by a positive attitude toward learning a foreign language. A typical example is, “I really enjoy learning Spanish.”

7. Attitudes toward Spanish-speaking people

This is a measurement of one of the “non-linguistic” goals. It may not be directly related to the ability to speak a foreign language but it is a very important component of the motivation. A typical example is, “I wish I could have many native Spanish speaking friends.”

8. Integrative Orientation

Another “non-linguistic” goal that is very important for the overall characteristic of the learning process. Typical example is,

“Studying Spanish is important because I will be able to interact more easily with speakers of Spanish.”

9. Desire to Learn Spanish

A typical example is, “I have a strong desire to know all aspects of Spanish.”

10. Spanish Course Evaluation

This is another validated measure that helps with the overall evaluation of the foreign language learning process. A typical example is, “I enjoy the activities of my Spanish course much more than those of other courses I had before.”

11. Spanish Use Anxiety

Anxiety is expected in the learning process but it would be preferable for a student to have a lower level of anxiety when using the foreign language. A typical example is, “I would get nervous if I had to speak Spanish to a tourist.”

12. Instrumental Orientation

The reason behind the desire to learn a foreign language is very relevant to the level of motivation of the person. A typical example is, “Studying Spanish is important because I will need it for my career.”

The three sets of scales AMS, IMI, and AMTB although related are used for slightly different purposes. AMS is used to evaluate the level of motivation to study foreign language before the actual study begins and repeated after the study is completed. IMI is focused on the intrinsic and extrinsic linguistic goals motivation after the study is completed. It is specifically developed to evaluate the post-experimental motivation. AMTB measures a wide variety of non-linguistic goals motivation and attitudes.

⁴ R. C. Gardner, The Attitude/Motivation Test Battery: Technical Report (1985), University of Western Ontario.

Part 2. Sample Description

The full starting sample for this study (N=303) was predominantly female (67.3%) and the racial decomposition was Black/African American (24.0%), White (65.2%) and Other (10.8%). The majority of participants (84.1%) had a B.A. degree or higher. The average age was 40.0 years with the youngest being 19 years old and the oldest being 65 years old.

Part of the respondents (39.1%) had some knowledge of Spanish, and 12.6% of the sample had spouses who spoke Spanish. A third (38.1%) of the sample knew another foreign language. Only four people (1.3%) reported having parents, grandparents or great grandparents who speak Spanish.

The reasons for studying Spanish were diverse: work (29.5%), travel (16.9%), general interest (44.7%), and other reasons (7.9%). Some of the other reasons were:

“All of the above.”

“Many Spanish people around me.”

“To help my kids learn Spanish.”

“To communicate with son-in-law and his family.”

“Relocation.”

“Enhance communication with students at my job and residents in my neighborhood.”

“It’s the second language spoken in the US. The need to learn it has become evident.”

“To communicate with my neighbors better.”

“I live in a large Spanish-speaking community.”

“Daughter married Costa Rican.”

Most of the respondents worked full time (71.9%) and their household income was significantly larger than the nation’s median, with 78.9% of them having more than \$50,000 annual household income.

There were no statistically significant differences between the three groups on

demographics, language ability and motivation for foreign language learning. This is an expected but important result which shows that there were no known differences between the three samples before the beginning of the study.

Table 2. Comparison by Initial Sampling Groups (N=303)*

Descriptives	RS N=203	AU N=50	BR N=50
Percent			
Male	42.9	40.0	44.0
Race			
Black	24.6	27.1	18.1
White	67.3	56.3	66.0
Other	8.0	16.7	16.0
Education (BA or above)	82.3	86.0	90.0
Mean			
Age	41.1	38.5	37.1
Initial WebCAPE	104.8	104.4	93.4
Academic Motivation Scale AMS			
1. Intrinsic motivation - to know	3.8	3.8	3.8
2. Intrinsic motivation - toward accomplishment	3.5	3.5	3.3
3. Intrinsic motivation - to experience stimulation	2.6	2.6	2.4
4. Extrinsic motivation - identified	2.5	2.3	2.2
5. Extrinsic motivation - introjected	3.2	3.2	3.0
6. Extrinsic motivation - external regulation	1.9	1.7	1.8
7. Amotivation	1.0	1.0	1.1

* None of the differences (RS-AU, RS-BR, AU-BR) were statistically significant.

DROPOUT RATE

There were 303 people that started this study, 69 dropped out and 234 of them finished. This makes the overall dropout rate 28.0%. The lowest dropout rate was for RS group and the highest for AU group

We compared the people who dropped out to the people who stayed in the study and we did not find any statistically significant difference except for education, with less educated people more likely to drop out of the study ($p=.008$).

Table 3. Dropout Rate

	Started	Dropped	Dropout Rate	Final Sample
RS	203	39	19.2%	164
AU	50	16	32.0%	34
BR	50	14	28.0%	36
Total	303	69	22.8%	234

Table 4. Dropped Out Group Comparison

Descriptives	In the study N=234	Dropped out N=69
Percent		
Male	41.0	47.8
Race		
Black	21.3	32.8
White	67.8	56.7
Other	10.9	10.7
Education (BA or above)	87.2	73.9*
Mean		
Age	40.5	38.1
Initial WebCAPE	109.0	82.1
Academic Motivation Scale AMS		
1. Intrinsic motivation - to know	3.8	3.7
2. Intrinsic motivation - toward accomplishment	3.5	3.3
3. Intrinsic motivation - to experience stimulation	2.5	2.6
4. Extrinsic motivation - identified	2.3	2.6
5. Extrinsic motivation - introjected	3.2	3.1
6. Extrinsic motivation - external regulation	1.8	1.9
7. Amotivation	1.0	1.0

* Significant difference ($p=.008$)

FINAL SAMPLE CHARACTERISTICS

The main descriptives of the final sample (N=234) of people who completed the study are presented below.

The sample was predominantly female (59.0%), with racial decomposition of Black/African American (21.3%), white (67.8%) and other (10.9%). It is very educated sample with 87.2% having a B.A. degree or higher with average age of 40.5 years. The initial Spanish language skills on average were well below the threshold for second semester of Spanish with average score of 109 out of a maximum of 956.

Table 5. Description of the Final Sample (N=234)

Descriptives	In the study N=234
	Percent
Male	41.0
Race	
Black	21.3
White	67.8
Other	10.9
Education (BA or above)	87.2
	Mean
Age	40.5
Initial WebCAPE (mean)	109.0
Academic Motivation Scale AMS 1 (low) – 7 (high)	
1. Intrinsic motivation - to know	3.8
2. Intrinsic motivation - toward accomplishment	3.5
3. Intrinsic motivation - to experience stimulation	2.5
4. Extrinsic motivation - identified	2.3
5. Extrinsic motivation - introjected	3.2
6. Extrinsic motivation - external regulation	1.8
7. Amotivation	1.0

We tested for differences between the final three sample groups and the comparison is presented below.

The final samples for the three software products did not differ on any of the descriptive and initial characteristics: demographics, Spanish language skill level and initial motivation level measured by AMS scale. .

Table 6. Comparison of Final Sampling Groups (N=234)*

Descriptives	RS N=164	AU N=34	BR N=36
Percent			
Male	42.7	38.2	36.1
Race			
Black	22.2	21.9	16.7
White	69.8	56.3	69.4
Other	8.0	21.9	13.9
Education (BA or above)	85.4	94.1	88.9
Mean			Mean
Age	41.5	39.7	37.1
Initial WebCAPE (mean)	108.3	123.4	98.2
Academic Motivation Scale AMS 1 (low) – 7 (high)			
1. Intrinsic motivation - to know	3.8	3.8	3.8
2. Intrinsic motivation - toward accomplishment	3.5	3.5	3.4
3. Intrinsic motivation - to experience stimulation	2.6	2.5	2.3
4. Extrinsic motivation - identified	2.4	2.2	2.2
5. Extrinsic motivation - introjected	3.2	3.2	2.9
6. Extrinsic motivation - external regulation	1.8	1.6	1.7
7. Amotivation	1.0	1.0	1.1

* None of the paired differences was statistically significant.

Part 3. Analysis

3.1. SCALE RELIABILITY

We tested the internal reliability of the scales included in this analysis using the Cronbach's Alpha coefficient (Cronbach, 1951). Usually a scale with Alpha close to 0.7 or above is considered reliable. Also Alpha of 0.7 is often viewed as acceptable for making decisions about groups of students, while Alpha of 0.9 is typically thought good enough for making individual decisions.

The results of the reliability tests are presented below.

According to the Cronbach's Alpha all but one of the subscales had good internal reliability. Only one subscale with a Cronbach's Alpha of .610 did not reach the desired level. This was the Pre- "Amotivation" subscale of AMS. For that reason the amotivation subscale will be excluded from the analysis. This exclusion is not a problem for the analysis because it is based on the individual scales which are not affected by the presence or absence of some scales.

Table 7. Reliability of pre- and post level of motivation (N=234)

Academic Motivation Scale AMS	Cronbach's Alpha	
	Pre AMS	Post AMS
1. Intrinsic motivation - to know	.807	.833
2. Intrinsic motivation - toward accomplishment	.889	.909
3. Intrinsic motivation - to experience stimulation	.847	.852
4. Extrinsic motivation - identified	.889	.923
5. Extrinsic motivation - introjected	.860	.879
6. Extrinsic motivation - external regulation	.846	.896
7. Amotivation	.610	.674

Table 8. Reliability of Post-experimental AMTB (N=234)

Attitude/Motivation Test Battery (AMTB)	Cronbach's Alpha
1. Interest in Foreign Languages	.707
2. Parental Encouragement	.949
3. Motivational Intensity	.769
4. Spanish Course Anxiety	.790
5. Spanish Software Evaluation	.951
6. Attitudes toward Learning Spanish	.864
7. Attitudes toward Spanish-speaking people	.820
8. Integrative Orientation	.780
9. Desire to Learn Spanish	.828
10. Spanish Course Evaluation	.913
11. Spanish Use Anxiety	.877
12. Instrumental Orientation	.725

Table 9. Reliability of Post-experimental IMI (N=234)

Intrinsic Motivation Inventory (IMI)	Cronbach's Alpha
1. Interest/Enjoyment	.913
2. Perceived Competence	.877
3. Effort/Importance	.851
4. Pressure/Tension	.745
5. Perceived Choice	.726
6. Value/Usefulness	.873

3.2. MOTIVATION AND ATTITUDE

INTRINSIC AND EXTRINSIC MOTIVATION (PRE- AND POST)

The AMS scale was used to determine the level of motivation at the beginning and the end of the study (pre- and post). The amotivation subscale did not reach the desired level of reliability and was excluded from the analysis.

There were no statistically significant differences for the initial levels of AMS scale (pre) by the three sample groups and only two significant differences for the AMS post levels. RS group had better post experimental motivation than BR group on “Intrinsic motivation - toward accomplishment” and “Extrinsic motivation – introjected”. The rest of the differences for the Post- AMS were not statistically significant.

CHANGES IN MOTIVATION

The changes in the level of motivation are measured by the difference scores computed as AMS score at the end of the study minus the AMS score at the beginning of the study.

Table 10. Pre- and Post AMS Results

Mean

Measure	Pre-level*			Post-level*		
	RS	AU	BR	RS	AU	BR
Academic Motivation Scale (AMS) 1 (Low) – 7 (High)						
1. Intrinsic motivation - to know	3.8	3.8	3.8	5.3	5.2	5.0
2. Intrinsic motivation - toward accomplishment	3.5	3.5	3.4	4.8**	4.4	4.2**
3. Intrinsic motivation - to experience stimulation	2.6	2.5	2.3	3.3	3.3	3.0
4. Extrinsic motivation – identified	2.4	2.2	2.2	3.0	2.8	2.4
5. Extrinsic motivation – introjected	3.2	3.2	2.9	4.3***	4.0	3.6***
6. Extrinsic motivation - external regulation	1.8	1.6	1.7	2.5	2.2	2.0

* No statistically significant differences for all pre- comparisons..

** Statistically significant difference RS-BR (p=.040 with Bonferroni correction).

*** Statistically significant difference RS-BR (p=.031 with Bonferroni correction).

There were no statistically significant differences in the DS for the three groups. But we are still interested in the direction of the effect sizes. If there is a pattern in the effect sizes this could be a justification to design a larger study that can test the statistical significance of these differences again.

Table 11. Difference Scores (DS) for AMS

Academic Motivation Scale (AMS)	Mean DS*			95CI*		
	RS	AU	BR	RS	AU	BR
1. Intrinsic motivation - to know	1.4	1.4	1.2	1.3-1.6	1.0-1.7	0.8-1.6
2. Intrinsic motivation - toward accomplishment	1.3	0.9	0.9	1.1-1.5	0.6-1.3	0.4-1.3
3. Intrinsic motivation - to experience stimulation	0.7	0.8	0.6	0.5-0.9	0.5-1.2	0.2-1.0
4. Extrinsic motivation – identified	0.6	0.6	0.2	0.5-0.8	0.2-1.1	-0.1-0.5
5. Extrinsic motivation – introjected	1.1	0.8	0.7	1.0-1.3	0.4-1.2	0.3-1.1
6. Extrinsic motivation - external regulation	0.6	0.6	0.3	0.5-0.8	0.2-1.0	0.01-0.5

* No statistically significant differences of the mean difference scores.

** Stratified estimates.

The following patterns can be defined based on the rank table. RS has the best results (mean rank=1.0) for the post levels of the motivation measured by post AMS scale. This is true also for all 6 subscales of AMS. AU has the second best results (mean rank=1.8) and BR is at the last place (mean rank=3).

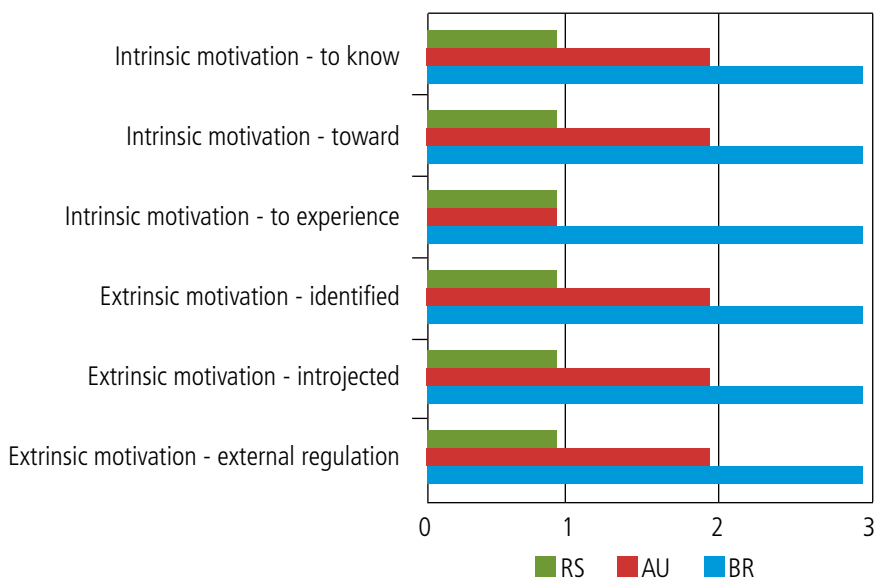
Table 12. Post AMS Ranks

Rank

Measure	Post level AMS			Difference Score		
	RS	AU	BR	RS	AU	BR
Academic Motivation Scale (AMS)						
1. Intrinsic motivation - to know	1	2	3	1	1	3
2. Intrinsic motivation - toward accomplishment	1	2	3	1	2	2
3. Intrinsic motivation - to experience stimulation	1	1	3	2	1	3
4. Extrinsic motivation – identified	1	2	3	1	1	3
5. Extrinsic motivation – introjected	1	2	3	1	2	3
6. Extrinsic motivation - external regulation	1	2	3	1	1	3
Average Rank (Mean)	1	1.8	3	1.2	1.3	2.8

The patterns are identical for the change in levels measured by the difference scores. RS has the lead (mean rank=1.2) followed closely by AU (mean rank=1.3) and BR as distant third (mean score of 2.8). This pattern of the effect size could be tested further with samples with more statistical power.

Figure 1. Post Experimental Motivation (AMS) Rank (Best=1)



LINGUISTIC GOALS MOTIVATION

The level of post experimental motivation was measured by the IMI inventory. All the subscales except Pressure/Tension can be interpreted in a positive direction. In other words the higher the score of the subscales, the better the motivations and attitude of the respondent. For example the higher the score of Interest/Enjoyment subscale, i.e. higher level of interest and enjoyment, the better the results are.

The Pressure/Tension subscale should be interpreted in the opposite direction; the lower the score, i.e. the lower level of the pressure/tension is, the better the result is. IMI has a 7 point scale (1-7) with the midpoint of 4 (neutral).

There were five statistically significant differences. RS group had better motivation than AU and BR groups on “Interest/Enjoyment” and “Perceived Competence”. RS group also had better motivation than AU group on “Perceived Choice.” This means that RS software users were more interested and enjoyed the process of learning foreign language more than the AU and BR groups did. The RS group exhibited more perceived competence and was more satisfied with their performance at studying Spanish than the other two groups.

The rest of the differences were not statistically significant.

Table 13. Post IMI Results N=234

Mean

Intrinsic Motivation Inventory (IMI)	RS	AU	BR	Statistically Significant Differences*
1. Interest/Enjoyment	5.9	5.2	5.3	RS-AU (p=.007) RS-BR (p=.015)
2. Perceived Competence	4.7	4.0	4.2	RS-AU (p=.009) RS-BR (p=.05)
3. Effort/Importance	5.1	4.8	4.7	
4. Pressure/Tension (lower is better)	2.6	2.9	2.5	
5. Perceived Choice	6.5	6.1	6.4	RS-AU (p=.04)
6. Value/Usefulness	5.7	5.7	5.6	

* With Bonferroni correction.

Table 14. Post IMI Confidence Intervals

95% CI*

Intrinsic Motivation Inventory (IMI)	RS	AU	BR
1. Interest/Enjoyment	5.8-6.1	4.7-5.7	4.8-5.7
2. Perceived Competence	4.6-4.9	3.5-4.5	3.8-4.6
3. Effort/Importance	4.9-5.3	4.4-5.3	4.3-5.2
4. Pressure/Tension	2.4-2.8	2.5-3.4	2.1-2.9
5. Perceived Choice	6.4-6.6	5.7-6.4	6.1-6.6
6. Value/Usefulness	5.6-5.9	5.3-6.1	5.2-6.0

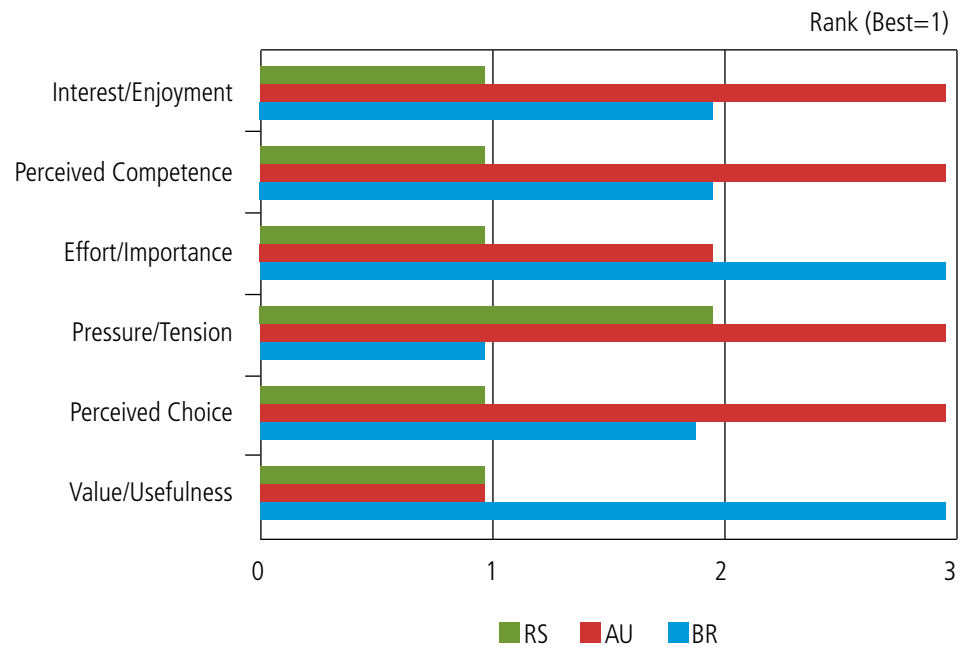
* Stratified estimates.

Based on the rank results it is evident that the same pattern is present here as it was with post AMS motivation. RS users showed the best results (mean rank=1.2) followed by BR (mean rank=2.2) and AU (mean rank=2.5). This means that on average RS users exhibit the highest average level of post experimental linguistic goals motivation. This pattern of course has to be tested further with much larger sample.

Table 15. Post IMI Ranks

Intrinsic Motivation Inventory (IMI)	Rank		
	RS	AU	BR
1. Interest/Enjoyment	1	3	2
2. Perceived Competence	1	3	2
3. Effort/Importance	1	2	3
4. Pressure/Tension	2	3	1
5. Perceived Choice	1	3	2
6. Value/Usefulness	1	1	3
Average Rank (Mean)	1.2	2.5	2.2

Figure 2. Post Experimental Linguistic Goals Motivation (IMI)



NON-LINGUISTIC GOALS MOTIVATION

The level of the motivation and attitude related to the non-linguistic goals was measured by the AMTB scale. AMTB works with a 6 point scale (1-6) with no neutral point so scores equal or below 3 (Strongly Disagree to Slightly Disagree) will be interpreted as a negative finding, or lack of motivation for a particular subscale. And, accordingly, scores above 3 (Slightly Agree to Strongly Agree) will be interpreted in favor or as presence of motivation.

There were 8 statistically significant differences. They showed that RS group had better results than AU group on “Motivational Intensity”, “Spanish Course Anxiety” and “Spanish Use Anxiety”. This means that RS software makes the users study more regularly (“every day”) than AU, and the anxiety to study and use Spanish language is lower in RS users compared to AU users.

RS group had lower results than BR group on “Parental Encouragement”. This means that in general the parents of BR

group were encouraging their children to learn foreign language more than the parents of RS group participants.

There are two subscales for which RS group performs statistically better than both AU and BR. They are “Spanish Software Evaluation” and “Spanish Course Evaluation”. The two differences RS-AU and RS-BR are statistically significant. This means that RS users very highly evaluate the software product and the language course and that this evaluation is higher than both AU and BR.

Table 16. Post AMTB Results (N=234)

Attitude/Motivation Test Battery (AMTB)	RS	AU	BR	Statistically Significant Differences*
1. Interest in Foreign Languages	5.3	5.4	5.2	
2. Parental Encouragement	3.1	3.5	3.9	RS-BR (p=.015)
3. Motivational Intensity	4.8	4.2	4.4	RS-AU (p<.001)
4. Spanish Course Anxiety (lower is better)	3.2	3.6	3.4	RS-AU (p=.037)
5. Spanish Software Evaluation	5.3	3.4	3.8	RS-AU (p<.001) RS-BR (p<.001)
6. Attitudes toward Learning Spanish	5.4	5.2	5.1	
7. Attitudes toward Spanish-speaking people	4.5	4.6	4.5	
8. Integrative Orientation	5.3	5.3	5.2	
9. Desire to Learn Spanish	5.3	5.1	5.0	
10. Spanish Course Evaluation	5.2	4.2	4.5	RS-AU (p<.001) RS-BR (p<.001)
11. Spanish Use Anxiety (lower is better)	3.5	4.0	3.6	RS-AU (p=.046)
12. Instrumental Orientation	3.7	3.6	3.4	

* With Bonferroni correction.

Based on the rank presentation we can confirm that the same pattern emerges here. The RS user exhibit on average the best results (mean rank=1.3) followed by AU (mean rank=2.2) and BR (mean rank=2.3). Here again further tests with much larger sample are necessary.

Table 17. Post AMTB Confidence Intervals 95% CI*

Attitude/Motivation Test Battery (AMTB)	RS	AU	BR
1. Interest in Foreign Languages	5.2-5.4	5.2-5.6	5.0-5.5
2. Parental Encouragement	2.9-3.4	2.9-4.0	3.4-4.3
3. Motivational Intensity	4.7-4.9	3.9-4.5	4.1-4.7
4. Spanish Course Anxiety	3.1-3.3	3.3-3.9	3.1-3.7
5. Spanish Software Evaluation	5.2-5.4	2.8-3.9	3.3-4.3
6. Attitudes toward Learning Spanish	5.3-5.5	4.9-5.4	4.8-5.4
7. Attitudes toward Spanish-speaking people	4.4-4.6	4.3-4.8	4.3-4.7
8. Integrative Orientation	5.2-5.4	5.1-5.6	5.0-5.4
9. Desire to Learn Spanish	5.2-5.4	4.8-5.4	4.7-5.3
10. Spanish Course Evaluation	5.1-5.3	3.7-4.6	4.1-4.8
11. Spanish Use Anxiety	3.3-3.6	3.6-4.3	3.2-4.0
12. Instrumental Orientation	3.5-3.8	3.2-4.0	3.0-3.8

Table 18. Post AMTB Ranks Rank

Attitude/Motivation Test Battery (AMTB)	RS	AU	BR
1. Interest in Foreign Languages	2	1	3
2. Parental Encouragement	3	2	1
3. Motivational Intensity	1	3	2
4. Spanish Course Anxiety	1	3	2
5. Spanish Software Evaluation	1	3	2
6. Attitudes toward Learning Spanish	1	2	3
7. Attitudes toward Spanish-speaking people	2	1	2
8. Integrative Orientation	1	1	2
9. Desire to Learn Spanish	1	2	3
10. Spanish Course Evaluation	1	3	2
11. Spanish Use Anxiety (low is better)	1	3	2
12. Instrumental Orientation	1	2	3
Average Rank (Mean)	1.3	2.2	2.3

Figure 3. Post Experimental Non-Linguistic Goals Motivation (AMTB) Scale 1-6.

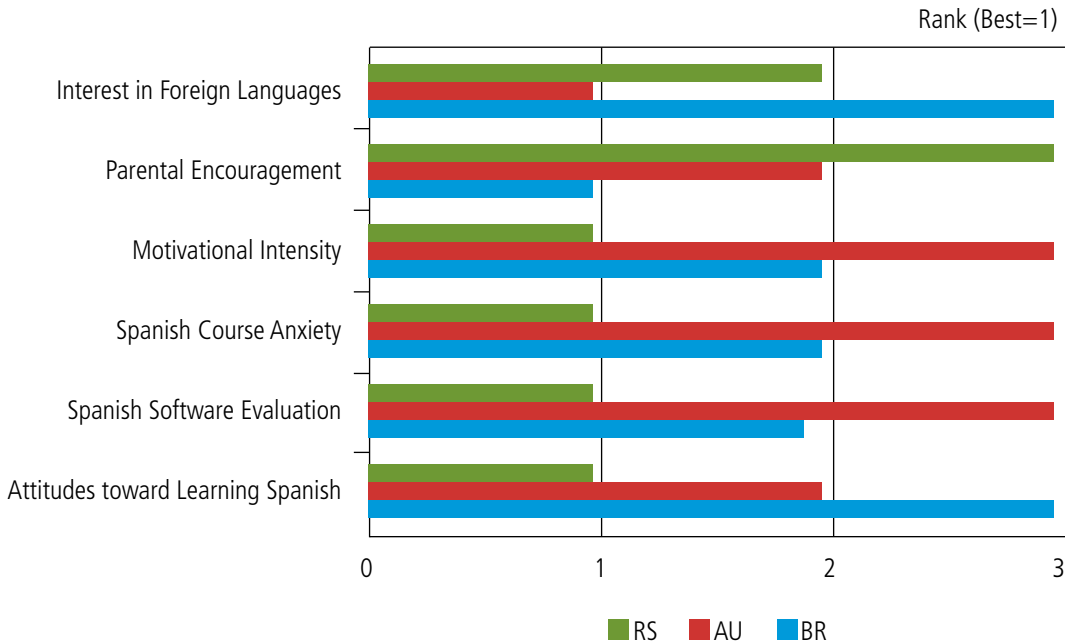
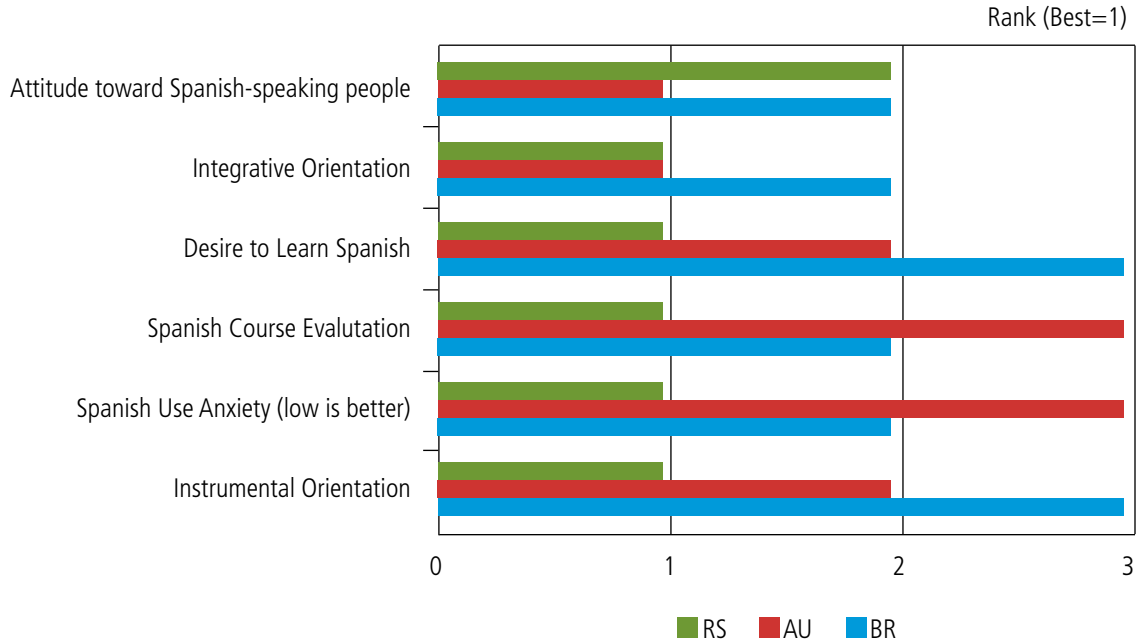


Figure 4. Post Experimental Non-Linguistic Goals Motivation (AMTB) Scale 7-12.



3.3. ADDITIONAL EVALUATION

The participants in this study were asked a series of single questions which did not constitute a scale. The purpose was to extract additional simple information about their evaluation of the software.

Experience.

All participants after using the software for one month were asked to evaluate 5 statements about their experience with the software with possible answers ranging from 1 (“Strongly Disagree”) to 5 (“Strongly Agree”).

Q1 (Easy). Rosetta Stone Spanish is easy to use.

Q2 (Helpful). Rosetta Stone Spanish is helpful in teaching me the language.

Q3 (Enjoyed). I enjoyed learning Spanish with Rosetta Stone.

Q4 (Satisfied). I am satisfied with Rosetta Stone Spanish.

Q5 (Recommend). I would recommend Rosetta Stone's software to others who are interested in learning Spanish.

If we consolidate the “Agree” and “Strongly Agree” we get the results in Table 20.

These results are very convincing that Rosetta Stone® Spanish is extremely easy to use, very helpful, satisfying, and enjoyable to work with. Finally, 90.2% of the users of Rosetta Stone software will recommend it to others.

There is a big gap in the results for the RS group and the other two groups. The users of AU and BR in general seem to be less satisfied, and they did not give high evaluations for the two respective products. Finally, only 30%-40% would recommend the software to others.

Table 20. Software Evaluation. Percent “Agree” or “Strongly Agree”

Evaluation	Percent		
	RS	AU	BR
Easy	92.1	44.1	66.7
Helpful	94.5	41.2	66.7
Enjoyed	91.5	44.1	55.6
Satisfied	86.0	26.5	47.2
Recommend	90.2	32.4	44.4

Conclusion

In this study, we were able to find a very clear pattern in the comparison of the motivation and attitude for the RS, AU and BR groups. Overall the RS users have clear advantage and their results are better in most cases but the lack of statistical power limits the ability to determine the statistical significance of some of these differences. For example, the RS users had the highest post experimental level of intrinsic and extrinsic motivation and attitude. The RS was the best performing group for all 6 subscales of the Academic Motivation Scale (AMS). The RS users had the highest level of post experimental linguistic goals motivation level. The RS group results were the best in 5 out of 6 subscales of the Intrinsic Motivation Inventory (IMI) scale. The RS users had the highest post experimental level of non-linguistic goals motivation. The RS group results were the best in 9 out of 12 subscales of the Attitude/Motivation Test Battery (AMTB).

There were some cases in which the group differences were statistically significant and they are listed below.

- The RS group had better post experimental motivation than the BR group on “Intrinsic

motivation - toward accomplishment” and “Extrinsic motivation – introjected.”

- The RS group had better motivation than the AU and BR groups on “Interest/Enjoyment” and “Perceived Competence” subscales. The RS group also had better motivation than the AU group on “Perceived Choice.” This means that the RS software users were more interested and enjoyed the process of learning foreign language more than the AU and BR groups did. The RS group exhibited more perceived competence and was more satisfied with their performance at studying Spanish than the other two groups.
- The RS group had better results than the AU group on “Motivational Intensity”, “Spanish Course Anxiety” and “Spanish Use Anxiety”. This means that the RS software makes the users study more regularly (e.g. “almost every day”) than the AU, and the anxiety to study and use Spanish language is lower in the RS users compared to the AU users.
- There were two subscales for which the RS group performed better than both AU and BR. They were “Spanish Software

Evaluation” and “Spanish Course Evaluation”. Both differences RS-AU and RS-BR were statistically significant. This means that the RS users evaluate very high the software product and the language course and this evaluation is higher than the AU and BR users.

There were very few differences between the AU and BR groups. In general AU users had slightly better results than BR users.

The RS users were very satisfied with the software with 90.2% ready to recommend the software to others who are interested in studying Spanish. The other two groups had considerably worse results with only 32.4% recommending AU and 44.4% recommending BR software.

We can conclude from this study that the research instruments and multidimensional scales worked well for the users of all three software products. The results are convincing that we could expect higher motivation and more positive attitude of the RS users in comparison with the AU and BR users. Additional research with more statistical power and sample size is necessary to validate some of the results and test for statistical significance.

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