Research Paper

The Relations between Students' Intercultural Communication Competencies and Employability

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Abstract

In today's globalised world, businesses operate on an international level. Most business and economics graduates will interact with colleagues, clients, and partners from diverse cultural backgrounds. Intercultural competencies are essential for their success and effective collaboration in the labour market. A special questionnaire was compiled to investigate students' intercultural competencies. Based on the statements and responses of the questionnaire, the examination aimed to establish the principal components of the intercultural communication competencies of the students of a Hungarian university. In the next phase of the research, the principal components served to create student clusters which were analysed from a labour market point of view, focusing on advantages and disadvantages. The crucial question was: which cluster is in demand the most in the labour market? By utilizing a principal component analysis, the dataset was reduced to three key components. Subsequently, to classify the students into groups, a multivariate statistical procedure, i.e., cluster analysis, was used to reveal the structures by clearly considering the similarities of a relatively heterogeneous population and to create a relatively homogeneous subset. The study revealed five distinct student clusters, each with varying advantages and disadvantages for employers. In this context, the Interculturally Active and Open with Good Language Skills cluster proved to be the most competent, with the least ideal collection indisputably being the Interculturally Reluctant in Cooperating cluster. The research underscores the importance of intercultural communication competencies for employees and enriches our understanding of the dynamics between intercultural communication competencies and workforce readiness. Developing these competencies in foreign language classes will significantly facilitate our students' employment.

Keywords: cluster analysis; intercultural communication; cultural diversity; foreign language competencies; openness to other cultures

Introduction

Effective communication between cultures is crucial for successful intercultural cooperation. In addition, it fosters relationships and understanding between people of diverse backgrounds. Furthermore, cross-cultural communication enhances the potential for collaboration, as it helps to bridge gaps in language, customs, and social norms

Fantini and Tirmizi (2006) define intercultural competencies as complex skills needed to perform efficiently and appropriately when communicating with individuals from a different culture who speak a foreign language (Fantini & Tirmizi, 2006). According to Leung and colleagues, intercultural competencies are significant for high-level and lower-level employees, such as sales staff or even factory workers, because of the cultural heterogeneity present in many countries (Leung et al., 2014).

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Intercultural, interpersonal, academic, professional and foreign language competencies are part of international competencies (Van Den Hoven et al., 2015). In interpreting competencies, we must begin at the individual's level, with their attitudes, then moving forward to the interpersonal, interactive level, essentially towards the results (Deardorff, 2006). In a culturally diverse group, the cultural background of its members can impact the successful management style, and the lack of language competence can make successful performance impossible (Aritz & Walker, 2014).

Intercultural competencies are to be established during the years of study in high school, college, and university (Awad, 2016; Dodge, 2016; McGuire-Snieckus, 2015). Students should receive an education that prepares them for the challenges of the 21st century: they need to control their work effectively and efficiently inside and outside their ethnical and cultural community (Banks, 2001). In order to achieve this, well-educated teachers with advanced intercultural competencies are required. Multicultural teaching competency is needed for teachers to manage diversity problems in a multicultural environment (Kucuktas, 2016).

Language barriers can be the source of negative emotions in a multilingual group. Furthermore, misunderstandings in a conflict can lead to disputes when some members can speak the group's working language at the native level while others cannot. In this case, the latter may feel anxious, confused, stressed, ashamed, disappointed, for having limited communication skills. Handling these conflicts is the global manager's job and requires intercultural adeptness (Tenzer & Pudelko, 2015).

Henderson's (2005) opinion is that we must differentiate whether it is a culturally or linguistically diverse multinational group. Regarding linguistic diversity, the members have different native languages, which impacts their communication. On the one hand, the lack of an appropriate vocabulary leads to difficulties in communication; on the other hand, the lack of sociolinguistic competencies causes the receiver to misinterpret the sender's message (Henderson, 2005).

Staying abroad, the individuals' personality traits, the recipient's cultural characteristics, the length of stay and the acculturational strategies all play a crucial role in the development of intercultural competencies (Behrnd & Porzelt, 2012; Belt et al., 2015). Even a shorter (1-6 weeks) stay may positively affect intercultural competencies, although individuals must possess high-level intercultural competencies beforehand. How long intercultural competencies are retained depends on the length of stay abroad; similarly, the period spent in a culture decides how much time has to pass before the gained competencies fade away after returning to the home country (Heinzmann et al., 2015). Surveying students' intercultural competencies has become increasingly popular in higher education, even among the students who have not studied abroad (Griffith et al., 2016).

According to Fantini (2000), developing intercultural competencies, foreign language and intercultural skills are strongly correlated. Understanding, comprehending and expressing ourselves in a foreign language are all intercultural competencies. The development of these is a process of improvement with its setbacks and stagnations, keeping in mind that, in the end, becoming "fully interculturally competent" is impossible (Fantini, 2000).

When selecting employees for assignments abroad, global organisations must choose the most suitable person for intercultural improvement (Saarentalo-Vuorimäki, 2015). Possessing relevant intercultural skills empowers employees to improve team collaboration, foster cultural sensitivity and respect, resolve conflicts, and ultimately elevate customer satisfaction within the workplace. The results of recent research conducted in several countries about employers' needs for graduates show that intercultural competencies are essential for their employability (Halila et al., 2021; Lantz-Deaton & Golubeva, 2020; Lázár. 2021; Pinto & Lourenço, 2021).

Data and Methods

Our first research question was: Can student groups with different intercultural competencies be established? In our second research question, we aimed to find which cluster was the ideal student cluster group for employers.

The following hypotheses were put forward in the study:

H1: "Regarding intercultural competencies, the students studied can be classified into clusters."

H2: "The student group with the most intercultural competencies is ideal for employers."

In the student research, a large-scale survey was used from applied research methods for students at the university. For this purpose, a special questionnaire was compiled and applied, and 1233 students completed it anonymously. The gender breakdown of the respondents was as follows: 44.2% male (545) and 55.8% female (688). The questionnaire included attitude inquiries with potential responses on a 5-point Likert scale. At the beginning of the questionnaire, students had to give their gender and age.

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The respondents were asked to mark how much they agreed with attitude statements on a 5-point Likert scale. 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree.

A set of twenty statements was employed, informed by secondary research focusing on the instruments utilised for evaluating intercultural communication proficiencies. These statements encompassed both the mindset and the aspects that could be considered when assessing this particular competency. Some attitude statements were: 'I would like to work and/or study abroad.' 'I like reading newspapers and news in a foreign language.' 'I like watching programmes and films in a foreign language.' 'I enjoy the company of foreigners.' 'I like reading and learning about other cultures.' 'I like travelling abroad.' 'My foreign language skills are good in writing.' 'I like learning foreign languages.'

We employed SPSS for Windows version 23.0 as our statistical software for data analysis. We used various techniques, including descriptive statistics, combined factors and cluster analysis. The clustering process involved the formation of groups based on factors derived from the test variables. During the cluster analysis, the segregation into five clusters effectively separated segments with unique characteristics. The crosstab analysis revealed that the student's gender did not definitively determine their membership in one cluster over another.

Data collection occurred between September and December 2019 through a guided process. Respondents were allowed to anonymously complete questionnaires at three different faculties within the University of Debrecen. Students from the three faculties and classes filled in the questionnaire with caution for repetition not to occur. Students received oral instructions and information about why they were asked to complete the questionnaire. Additionally, they could ask for clarification, and then they filled out the questionnaire. The number of students completing the questionnaires was 905 at the Faculty of Economics and Business, 186 at the Faculty of Engineering and 142 at the Faculty of Informatics. Altogether, we analysed 1233 answers from students.

Results

The questionnaire aimed to capture students' intercultural communication competencies with 20 attitude statements. A 5-point Likert scale was used to indicate to what extent the statement characterises a student.

Factor analysis followed the above-mentioned independent examination of the statements. After analysing the principal component and cluster analysis, groups were successfully created during the result analysis. The condition of the factor analysis was provided primarily by The Kaiser-Meyer-Olkin (KMO) criterion, the value of which was 0,931. It was adequate (KMO0,9 is adequate). Bartlett's test was also prosperous (p<0,05).

Based on these results, the respondents were categorised into homogenous groups, and in the course of further calculations, these groups were compared with the other variables.

After the principal component analysis, three principal components were formed and named: *Intercultural Cooperation (principal component 1)*, the Level of Language Knowledge (principal component 2) and the Usefulness of Language Knowledge (principal component 3). The statements were created after exploring the relevant literature, which studied the components of intercultural communication competency. The questionnaire did not contain too many statements so that students could remain enthusiastic and prudent when filling it in. However, it did have enough statements to successfully create principal components, and then a cluster analysis was applied to identify the appropriate clusters (Table 1.).

Table 1. Factors obtained during the principal component analysis

	Principal Components		
Competency statements		2	3
I like learning with international students.	.789		
I like communicating with international students in and outside of class.	.749		
I like making friends with foreigners.	.749		
I enjoy the company of foreigners.	.748		
I would like to work with foreign colleagues.	.710		
I like communicating in a foreign language outside of class.	.616		
I like communicating in a foreign language in class.	.584		
I would like to communicate in a foreign language in writing and speaking at my job.	.569		
I would like to work and/or study abroad.	.517		
I can easily understand texts in a foreign language.		.775	
My foreign language skills are good in writing.		.740	
I can easily understand speech in a foreign language.		.719	
My foreign language skills are good in speaking.		.696	
I like reading newspapers and the news in a foreign language.		.694	
I like watching programmes and films in a foreign language.		.521	
I think foreign language knowledge is essential.			.801
I think foreign language education is essential.			.796
I like travelling abroad.			.611
I like learning foreign languages.			.488
I like reading and learning about other cultures.			.408

(Source: Authors' contribution, 2023)

Upon analysing the research findings from the student study, we were able to discern the presence of five clusters through cluster analysis, where *Intercultural Cooperation (principal component 1)*, the Level of Language Knowledge (principal component 2) and the Usefulness of Language Knowledge (principal component 3) factors were typical to different extents. Therefore, we accept our H1 hypothesis.

Intercultural Cooperation refers to how open the individuals are to those who come from different cultural backgrounds and how intercultural their personality is. As the world is getting increasingly diverse, there is an increasing need for a workforce with intercultural communication competencies. These employees have the required skills to adapt to and manage in an intercultural work environment. It is advisable to measure these competencies during the study years and then consider the results when executing improvement objectives. University students are also expected to become managers in decision-making positions, and we can predict their intercultural communication effectiveness based on the results. Mobility and diversity are worldwide phenomena, and because of their significance, the conditions of interactions with individuals from different linguistical and cultural backgrounds are greatly emphasised. Intercultural cooperation includes statements such as 'I like learning with foreign students' 'I like communicating with foreign students in and outside of class" I would like to work with foreign colleagues. Based on these statements, these students enjoy using their language skills to make friends and communicate with foreigners. When encountering different cultural values and standards, these individuals are not prejudiced; they are flexible and enjoy interacting with people from different cultural backgrounds.

The Level of Language Knowledge is fundamental because it is essential to intercultural communication competency. It is an indispensable condition to perform effectively in a culturally diverse atmosphere. In order to be able to express ourselves and understand others during an intercultural interaction, individuals' foreign language competence is a communication tool. When recruiting, an adequate level of language knowledge is one of the most important requirements of organisations. Organisations with both Hungarian and international ownership require high-level foreign language knowledge from employees because of the emergence of international global markets and internationalisation. Students with adequate language knowledge levels enjoy reading materials and watching programs in a foreign language. Today's youth has access to an enormous amount of content in foreign languages, such as videos, news, blogs, and streams, requiring a certain level of

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language knowledge to enjoy them. Furthermore, this content, other than being entertaining, offers the possibility to improve existing language skills.

The Usefulness of the Language Knowledge factor includes statements showing to what extent students understand the importance of language knowledge, how effectively they will harness it in the future, and how willing they are to invest in obtaining language knowledge to achieve future goals. They believe foreign language education and knowledge are essential, and they are open to other cultures and learning languages. When travelling abroad they can experience the impact of different cultures when, and the significance of language knowledge; at the same time, they obtain intercultural experiences and impressions that will positively influence their intercultural communication competencies and language knowledge.

Table 2. Clusters and characterising principal components

	Principal Components		
Clusters	1. Intercultural Cooperation	2. Level of Language Knowledge	3. Usefulness of Language Knowledge
1. Interculturally Open (N=238)	characteristic	non-characteristic	non-characteristic
2. Interculturally Reluctant in Cooperating (N=224)	non-characteristic	non-characteristic	characteristic
3. Interculturally Passive (N=205)	non-characteristic	characteristic	characteristic
4. Interculturally Open with Poor Language Skills (N=259)	characteristic	non-characteristic	characteristic
5. Interculturally Active and Open with Good Language Skills (N=307)	characteristic	characteristic	characteristic

(Source: Authors' contribution, 2023)

The five clusters identified are the following: 1. Interculturally Active and Open with Good Language Skills 2. Interculturally Open with Poor Language Skills 3. Interculturally Passive 4. Interculturally Open 5. Interculturally Reluctant in Cooperating.

The first cluster is *Interculturally Open*, the characteristics of which include cooperation and willingness for intercultural communication. However, their foreign language skills are low, so they should make an effort to improve their skills in the present to be able to communicate more appropriately in the future.

The second cluster is *Interculturally Reluctant in Cooperating*, with low-level intercultural communication and language competencies. However, they understand that improving those skills will be indispensable to achieving their goals.

The third cluster is *Interculturally Passive*, whose members are not interculturally cooperative. They are not open to intercultural communication, but their language skills are adequate. They know the significance of these skills, which could enable them to harness this knowledge in the future.

The next cluster is *Interculturally Open with Poor Language Skills*, whose members gladly engage in intercultural cooperation, but their poor language skills immensely limit their successful accomplishment.

Last but not least, the cluster of *Interculturally Active and Open with Good Language Skills* must be mentioned. All three factors can characterise this cluster. It means that they are the most suitable students and employees. They possess exceptional language skills and are open to intercultural relations and interactions. They understand the importance of language skills and are also interested in other cultures (Table 2.).

Table 3. Distribution of clusters by gender

Clusters	Male	Female	Total
1. Interculturally Open	147	91	238
	27.0%	13.2%	19.3%
2. Interculturally Reluctant in Cooperating	81	143	224
	14.9%	20.8%	18.2%
3. Interculturally Passive	87	118	205
	16.0%	17.2%	16.6%
4. Interculturally Open with Poor Language Skills	99	160	259
	18.2%	23.3%	21.0%
5. Interculturally Active and Open with Good Language Skills	131	176	307
	24.0%	25.6%	24.9%
Total	545	688	1233
	100 %	100 %	100 %

(Source: Authors' contribution, 2023)

This table shows a significant difference in the case of three clusters between genders, while the percentages are almost equally distributed in the remaining two clusters.

The most significant difference (13.8%) can be perceived in the case of the first cluster; furthermore, this is the only cluster where the proportion of males is higher than females. The characteristics of this cluster are relatively more accurate for males than females, which means that a more significant proportion of males are open to intercultural interactions. They enjoy communicating with foreigners and being in their company.

In the case of the second cluster, we can still observe a difference (5.9%) between genders, but here the proportion of females is higher than males. It indicates that more females understand the importance of language knowledge, and perhaps they are more diligent when it comes to foreign language learning.

The third highest difference occurs in the case of the fourth cluster, which is slightly lower (5.1%) than the previous one, and the proportion of females is also higher here. Consequently, female respondents are more open interculturally but have poorer language knowledge than males.

In the case of the first and fifth clusters, there is a minor difference (1.2% and 1.6%) between them. The characteristics of these two clusters are accurate almost equally for both genders (Table 3.).

Finally, we identified the different advantages and disadvantages each cluster represents from employers' point of view (Table 4.).

Table 4. Characteristics of clusters from employers' points of view

Clusters	Advantages	Disadvantages	Investment
1 Interculturally Open	openness	language knowledge motivation	language course (motivation- uncertain
2. Interculturally Reluctant to cooperate	motivation	language knowledge openness	language course intercultural training
3. Interculturally Passive	language knowledge, motivation	openness	intercultural training
4. Interculturally Open with Poor Language Skills	openness motivation	language knowledge	language course
5. Interculturally Active and Ope with Good Language Skills	openness, language knowledge, motivation	none	none

(Source: Authors' contribution, 2023)

Based on the above, we are able to justify our hypothesis H1 since the students can be classified into different clusters according to the main components of intercultural competencies.

It can be established that from employers' point of view, there is only one ideal cluster: *Interculturally Active and Open with Good Language Skills*. When employing the members of this cluster, the employer does not need to invest in training to improve employees' intercultural communication competencies. Three more

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clusters are ideal under certain conditions, and these are the following: Interculturally Open with Poor Language Skills, Interculturally Passive, and Interculturally Open. In the case of employing members of these clusters, organisations have to invest in improving their language skills or increasing their intercultural openness. One cluster that causes significant challenges to organisations is the Interculturally Reluctant to cooperate. In their case, both their language skills and intercultural openness need improvement. They manage less effectively in today's culturally diverse working environment. Although the least advantageous cluster is Interculturally Reluctant in Cooperating, it is still worth considering the students in this cluster. Because of their motivation, they can quickly achieve adequate language skills.

Furthermore, they are willing to improve their intercultural communication competencies to increase their openness to other cultures. Nevertheless, to see the whole picture, we must add that employers must invest in improving these skills. The currently available recruitment methods are fit to enable employers to assess applicants' competencies and decide what extent they are willing to invest in improving missing competencies.

Based on the above, and in line with the literature, (Halila et al., 2021; Lantz-Deaton & Golubeva, 2020; Lázár. 2021; Pinto & Lourenço, 2021) we accept hypothesis H2, as the ideal student for employers is one with intercultural competencies, openness to learning about other cultures and good foreign language competencies. Thus, employers do not need to invest financial resources in training to develop the skills needed (foreign languages, intercultural).

Conclusions

The students' research was executed with a compiled questionnaire containing 20 attitude statements. Students were to use a 5-point Likert scale to indicate how much the statement was characteristic to them; after analysing students' responses, we identified five clusters: 1. Interculturally Active and Open with Good Language Skills 2. Interculturally Open with Poor Language Skills 3. Interculturally Passive 4. Interculturally Open 5. Interculturally Reluctant in Cooperating. The most suitable members for organisations belong to the Interculturally Active and Open with Good Language Skills cluster because they have outstanding language knowledge and a willingness to be open to intercultural relationships and interactions.

Moreover, they understand the importance of foreign languages, so employing them does not require training investments to improve their intercultural competencies. However, the least ideal cluster is undoubtedly the *Interculturally Reluctant to cooperate*, as their intercultural competencies are not sufficient, and they do not have openness to other cultures. Employers have to make significant investments in training in the case of hiring the members of this cluster.

Courses and training using the results of this research equip employees with strong intercultural competencies, make them generally more resilient, allow them to navigate unfamiliar situations, work effectively in diverse teams, and adjust to changes in the global business landscape.

In our future research endeavours, exploring intercultural competencies will extend to include a focus on international students of the same faculties of the University of Debrecen. This expansion of the research scope aims to contribute to academic knowledge and better prepare students for the labour market.

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References

- Aritz, J., & Walker, R. C. (2014). Leadership styles in multicultural groups: Americans and East Asians working together. *International Journal of Business Communication*, 51(1), 72–92.
- Awad, L. C. (2016). Business as usual? Faculty understanding of cultural competence and its impact on practice [Unpublished doctoral dissertation]. Northeastern University, Boston.
- Banks, J. A. (2001). Citizenship education and diversity: Implications for teacher education. *Journal of Teacher Education*, *52*(1), 5–16.
- Behrnd, V., & Porzelt, S. (2012). Intercultural competence and training outcomes of students with experiences abroad. *International Journal of Intercultural Relations*, 36(2), 213–223.
- Belt, J., Ham, A., Kaulingfreks, F., Prins, B. B., & Walenkamp, J. (2015). World Citizenship: developing intercultural competence in international and multicultural Dutch classrooms: the effectivity of the

- PREFLEX@ Home Programme: a pilot study at The Hague University of Applied Sciences. The Hague University of Applied Sciences.
- Deardorff, D. K. (2006). Identification and assessment of intercultural competence as a student outcome of internationalisation. *Journal of Studies in International Education*, 10(3), 241–266.
- Dodge, J. A. (2016). "But I Wouldn't Do That": Teaching Cultural Empathy [Unpublished doctoral dissertation]. George Fox University, Portland.
- Fantini, A. (2000). A central concern: Developing intercultural competence. SIT Occasional Paper Series, 1(1), 25–42.
- Fantini, A., & Tirmizi, A. (2006). *Exploring and assessing intercultural competence*. World Learning Publications. Research Paper 1. Washington University: St. Louis, Missouri.
- Fantini, E., Dansero, E., & Ghislieri, C. (2017). Developing Competences for Development Cooperation: Italian Students 'experiences of International Mobility In The Global South. *Junco Journal of Universities and International Development Cooperation* (pp. 3–13).
- Griffith, R. L., Wolfeld, L., Armon, B. K., Rios, J., & Liu, O. L. (2016). Assessing intercultural competence in higher education: Existing research and future directions. *ETS Research Report Series*, *2*, 1–44.
- Halila, F., Pillalamarri, K., Bell, R., Ali, S., Moser, K., Prouska, R., Tungtakanpoung, M., Godts, I., Mulier, L., Saraç, M., & Bektaş, O. (2021). *The Intercultural Skills Graduates and Businesses in Europe Need Today*. Project Report.The European Commission.
- Heinzmann, S., Künzle, R., Schallhart, N., & Müller, M. (2015). The Effect of Study Abroad on Intercultural Competence: Results from a Longitudinal Quasi-Experimental Study. *Frontiers: The Interdisciplinary Journal of Study Abroad, 26*(1), 187–208.
- Henderson, J. K. (2005). Language diversity in international management teams. *International Studies of Management & Organization*, 35(1), 66–82.
- Kucuktas, S. (2016). *Examination of Faculty Members' Multicultural Teaching Competencies at a Four-Year Institution* [Unpublished doctoral dissertation]. Auburn University.
- Lantz-Deaton, C., Golubeva, I., Lantz-Deaton, C., & Golubeva, I. (2020). What Are the Links Between Intercultural Competence and Career Development?. In *Intercultural Competence for College and University Students: A Global Guide for Employability and Social Change* (pp. 223–252).
- Lázár T. (2021). A nyelvi és az interkulturális kommunikációs kompetenciák iránti szervezeti elvárások [Organisational expectations of language and intercultural communication competences] [Unpublished doctoral dissertation]. Ihrig Károly Gazdálkodás- és Szervezéstudományok Doktori Iskola. Debreceni Egyetem.
- Leung, K., Ang, S., & Tan, M. L. (2014). Intercultural competence. *Annual Review of Organizational Psychology and Organizational Behaviour, 1*(1), 489–519.
- McGuire-Snieckus, R. (2015). Towards a unified vision and assessment of the multifaceted construct of global citizenship in higher education. In J. Friedman, V. Haverkate, B. Oomen, E. Park & M. Sklad (Eds.), Going global in higher education: the theory, teaching and measurement of global citizenship. Middelburg.
- Pinto, S., & Lourenço, M. (2021). Intercultural competence in the voices of Portuguese employers: Implications for higher education institutions. In: *EDULEARN21 Proceedings*, IATED 1857–1865).
- Saarentalo-Vuorimäki, J. (2015). Finnish expatriates' adaptation to a multicultural environment. Doctoral dissertation. The University of Helsinki.
- Tenzer, H., & Pudelko, M. (2015). Leading across language barriers: Managing language-induced emotions in multinational teams. *The Leadership Quarterly*, 26(4), 606–625.
- Van den Hoven, R. F. M., Walenkamp, J. H. C., & den Heijer, J. (2015). Study or internship abroad and the acquisition of international competencies. Research Group International Cooperation The Hague University of Applied Sciences Report.



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