

# Adoption of e-technology in the context of training in sustainability programs, cultural characteristics and European experience

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**Abstract.** This study examines the influence of culture at the individual level on the adoption and use of electronic distance learning technologies by students of a technical university when teaching in sustainable development programs. Four cultural dimensions were investigated: individualism / collectivism, masculinity / femininity, power distance and uncertainty avoidance at the individual level. We also used the Technology acceptance model (TAM), which includes additional constructs. The results of the study demonstrated that perceived usefulness, perceived ease of use, social norms, quality of work life, individualism, masculinity were important determinants of students' behavioral intentions to adopt e-learning technologies when teaching in sustainable development programs. The results obtained are considered both from a theoretical and a practical point of view, recommendations for improving electronic distance learning are proposed.

## 1 Introduction

Nowadays, the influence of deep-rooted cultural values, ways of perception and thinking on the learning process in higher educational institutions is becoming more and more obvious. Features of culture affect the perception, processing and systematization of knowledge, the development of skills. The communicative style, ways of solving problem situations, categorizing knowledge, analyzing and synthesizing new knowledge also depend to a large extent on culture. E. Dennehy suggested that the perception of reality in a wide social context, typical of Eastern cultures, is rooted in their collectivist, social values, while the tendency to categorize and conceptualize objects and ideas in Western cultures can potentially be linked to their individualistic values. [1]

In the scientific literature, much attention is paid to the importance of understanding how cultural characteristics affect the learning process. This understanding allows the development of culturally adaptive approaches to teaching and learning. G. Hofstede considered the characteristics of the culture of students and the processes of socialization to be the most significant factors influencing the preferred ways of learning. Moreover, the ways and methods of teaching, learning, educational concepts, which seem to be the same in many countries, may differ in terms of the influence of cultural values on them. This statement has led to increased research on the influence of culture on learning. [2]

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According to G. Hofstede and his followers, national culture is manifested in the activities of society and its social institutions, as well as in national traditions, style of thinking and attitudes, stereotypes and patterns of interpersonal and intergroup behavior and self-expression, in education, language and lifestyle features. [2] The influence of culture on leadership and individual behavior has been examined in many studies. [3]

The features of culture are most fully disclosed in the typology of cultural dimensions by G. Hofstede, among them: "individualism / collectivism", apparently, is the most widespread measurement in comparison with others used in intercultural studies. Pronounced representatives of individualistic cultures strive for personal independence, they have an intention to emphasize their uniqueness. The achievement of personal goals and their own well-being is more important than the achievement of the group's goals and the well-being of the group; the desire for innovation is manifested. On the other hand, for representatives of collectivist cultures, the general well-being of the group and loyalty to it are of high importance for the individual. Individuals prefer loyalty and group success to their own personal gain. The connections between the individual and the social group are deep, strong, the opinion of the group and relatives is important for the individual. [4]

Many empirical studies examined the relationship between cultural dimensions of G. Hofstede and the process of studying at a university. H. Jiang found that students from collectivist cultures in the process of learning are more likely to highlight their status in the circle of peers than personal achievements. In their studies, Western students from individualistic cultures often view education as a means of achieving their goals or as a way to get a good job or high wages, while East Asian students are often motivated by family, face preservation, and peer support. [5]

The dimension "power distance" measures the degree to which less powerful members of society expect and recognize an unequal distribution of power in society. with high power distance willingly obey orders, work strictly according to instructions, and carefully show personal initiative in their studies. They were reluctant to ask questions of teachers, avoided contradicting them, and in some cases did not want to publicly express their opinions. [6] Individuals with a low level of power distance are often democratic, they do not feel discomfort, approaching their bosses, they are not inclined to quickly yield to representatives of power. They show independence of thought, defend their opinion in discussions, including with reputable teachers. In addition, they are often more open in terms of social contacts, looking for alternative opinions, and may perceive the help of informal mentors as a great value. [5]

Strongly pronounced masculinity implies behavior associated with the desire of individuals for social achievement, a focus on instrumental values, a tendency to assertiveness, innovation, heroism, self-confidence, and the expectation of a proportionate reward for success in work and study. While pronounced femininity is associated with the desire for cooperation, emotionally comfortable interpersonal relationships, with taking care of the weak members of society and improving the overall quality of life. [4]

Uncertainty avoidance is defined as the degree to which members of a community feel uncomfortable with fuzziness and ambiguity. Students with low degree of uncertainty avoidance show a high tolerance for fuzziness, ambiguity, show greater innovation and entrepreneurship, and are more tolerant of risk. Students with high degree of uncertainty avoidance tend to seek clearer and simpler ways to explain facts and circumstances. They tend to perceive unknown and uncertain situations as a danger, a threat, such situations cause stress and anxiety. This means the need for clear rules and structuring of life, great loyalty to the usual ways of learning, a suspicious attitude towards any innovations. Even ineffective, but clear rules in these cultures are more preferable. [4]

In modern conditions, education is critical in promoting the ideals of sustainable development. Education for sustainability can be thought of as learning how to design and

make decisions that take into account the long-term future, equitable development of all communities, as well as promoting their cultures and increasing the resilience and vitality of societies. [7] The implementation of this concept of education has caused changes in the educational programs of universities. In the curricula of technical universities, the corresponding educational disciplines were introduced. These disciplines consider the following problems: 1) sustainable development of urbanized territories; 2) the formation of natural zones in the master plans of cities; 3) architectural ecology; 4) energy and resource saving technologies in the operation of buildings.

The process of informatization of education and the intensive development of distance e-learning systems help to implement new requirements for higher education, the principles of sustainable development. Such education has the ability to integrate, provides access to information resources located in different regions of the world. [8]

Currently, universities are implementing educational programs or their component parts using e-learning, distance technologies in the forms of education (or in their combination) provided for by the Federal Law of December 29, 2012 "On Education in the Russian Federation". Some difficulties along the way should also be noted. The obstacles are due to the fact that neither students nor teachers in higher education institutions are often ready to implement the e-learning model and master new technologies. In addition, the lack of strict regulation in the process of distance learning leads to an internal "discouragement" of all participants in the educational process. Therefore, distance education technologies have to be used in combination with traditional classroom teaching. [9]

Distance electronic technologies can greatly assist learners in the learning process, but the effectiveness of e-learning technologies ultimately depends on their acceptance and use by students. In this case, such factors as the intention to use electronic technologies, as well as the knowledge and skills of students in this area, play a role. These intentions should be ensured by the development of additional professional programs, the regular mastering of new computer technologies, this will facilitate training and movement up the career ladder.

The introduction of distance electronic technologies has had a huge impact on the interaction between a student, who develops the skills of independent work, and a teacher, who is able to motivate students to achieve success. In the course of teaching academic disciplines at the university, software tools such as Google, Microsoft, Dropbox, Moodle, Youtube and others are used. Their capabilities allow real-time training. [10] But, while increasing the efficiency of the educational process on some aspects (automation of teaching, modularity, personification, etc.), these technologies reduce its effectiveness in other aspects. The participants in the educational process named weaknesses of the use of electronic technologies in education: there is an opportunity for another person to take current control measures, a more loyal attitude of teachers to distance students, which leads to a decrease in the effectiveness of learning, unpopularity of distance education among applicants, mistrust among employers. [11]

The practice of joint implementation of educational programs and objectives of environmental sustainable development based on distance e-learning is becoming more widespread in higher education. This is evidenced by the European experience. The governments of European countries are interested in distance e-learning, but the approaches to its organization and the contingent of students in different countries differ significantly. In Germany and Holland, open distance learning is widely used in universities. For more than thirty years, the National University in Spain (UNED) has been working on distance learning programs, it includes more than 50 training centers in the country and 9 abroad. Over 50 universities in the Baltic region are consolidating their efforts to implement distance learning at the Baltic University in Sweden.

In Russia, little research has been done on student acceptance and adaptation to e-learning technologies. The support of traditional styles of pedagogy in higher education, the lack of

equipment and properly trained personnel create obstacles to effective e-learning, therefore it is important to study the intrapersonal factors that may induce the mastery of computer learning technologies [12].

In connection with the introduction of information systems and the assimilation of information technologies, researchers often use behavioral models, such as the Theory of reasoned action (TRA), Technology acceptance model (TAM), to empirically study the factors that determine the adoption of information technologies. Many studies have confirmed the explanatory power of these models in the context of the implementation of information systems in different sectors of the economy, and have successfully extended these models to the context of e-learning. [13] Since the Internet is a global network, it is necessary that the effectiveness of individual computer programs and applications be verified when operated in a local, national context. [14]

Theory of reasoned action (TRA) by I. Aisen and M. Fishbein considers two unique factors: attitudes towards behavior (ATT) and perceived social norms (SN), ideas about what kind of behavior others expect and the desire to meet their expectations) that contribute to behavioral intent (BI), which finally explains the actual behavior. The basic assumption of the TRA is that the rationality of individuals uses all available information before start mastering new technology. This theory was further developed in Theory of Planned Behavior (TPB), the modification of TRA, proposed by I. Aizen. The factor of perceived behavioral control has been added to it. [15]

The technology acceptance model (TAM) is derivate from TRA model. TAM model was developed by F. Davis and R. Bagozzi based on an analysis of the literature on the acceptance of information technology by the user. According to the TAM model, behavioral intention to use information technology is directly determined by two key factors: perceived usefulness and perceived ease of use of technology. Perceived usefulness (PU) is the degree to which an individual believes that the use of technology will improve his (her) performance, an individual evaluates the external characteristics of computer technology (task-oriented). Perceived Ease of Use (PEU) reflects the technology application experience and its intrinsic characteristics (e.g., ease of mastering, flexibility, intuitive interface, graphical editors). External variables, such as social influence, are an important determinant of attitudes towards the use of technology, and they will give individuals an attitude and intention to use the technology. [16] Many studies have recently confirmed this relationship between behavioral intention (BI) and actual use in an e-learning context. [13]

Social external factors, the learning environment at the university have a significant impact on students, because of them, information technologies are introduced into the educational process without fail. At the same time, with the voluntary mastering and use of technology and in the context of gaining experience, the process of introducing technologies will differ from forced mastering.

Researchers later added various variables to the TAM context, such as: self-promotion, social impact, experience of using technology, voluntariness of technology mastering, diversity and relevance of technologies for the learning process, student confidence in them, and some others. These variables have been added in various combinations to better understand how willing are users to accept new technologies. [17]

Certain cultural differences can influence the manifestation of external variables of the TAM model. Several authors found that the relationship between perceived ease of use (PEU) and behavioral intention (BI) was stronger in feminine cultures, as these cultures tend to place more emphasis on creating a more comfortable work environment. Perception of technology can change depending on the age and gender of a student. [18]

Currently, there is little research examined the influence of the characteristics of national cultures on the process of online learning and teaching. Most of these studies have been carried out at the national or organizational level, which creates a number of limitations. First,

researchers often rely on historical data regarding the cultural characteristics of specific countries or regions. Modern research has shown that over the past two decades there have been significant shifts in the cultural dimensions of a number of countries, therefore, the conclusions based on the works of G. Hofstede in the 1980s may become irrelevant. This means that it is important to directly measure the characteristics and values of the cultures of the individuals taking part in a new study. [19] In addition, in connection with the application of G. Hofstede's model, difficulties may arise in understanding which dimension of culture had a greater impact on the differences between samples from different countries. As a result, it becomes difficult to select a sample for the study. The third problem is that the citizens of the same country differ in cultural dimensions. National culture is a macro-level phenomenon, and the adoption of technology by users should be studied at the individual level. G. Hofstede himself mentioned that his analysis at the level of countries and cultures cannot predict individual behavior, which means that the use of constructs of national culture is problematic in models of the individual level. [4]

But, despite the criticism, cultural dimensions of G. Hofstede are more preferable, since they allow comparing the results obtained with the previous ones, are widely recognized in the scientific community. In Russia, with the help of the methods of G. Hofstede, research has been carried out several times and a considerable amount of empirical material has been accumulated. [20]

A number of authors have recommended versions of the methodology of G. Hofstede, which can be used in conjunction with models of the individual level. These are the scales, borrowed from the works of G. Hofstede, for measuring cultural values at the individual level. [21]

It is important to examine the impact of cultural dimensions on the main components of the TAM model in the context of e-learning. Since the theoretical limitation of the TAM model is the underestimation of the influence of social factors and personal control, social norms (SN) and quality of work life (QWL) were included in the study. Social norms are determined through the individual's perception of what most significant people think about his (her) actual behavior. The significant influence of social norms on behavioral intention has been identified in many studies. [22] This study examines only the direct influence of social norms on behavioral intention, and is expected to be positive due to the high power distance in Russian culture, which means that students will be inclined to learn and use the technology as directed by their superiors or colleagues, even if they are not convinced of its usefulness. The quality of work life (QWL) has been proposed by several authors as a potentially significant factor, from the point of view of students, it is considered from the standpoint of economic benefits and increasing opportunities for advancement in training and the acquired profession. It is expected that the higher the QWL, the better the technology perception will be. [23] Since it was found that the quality of work life is usually valued more in feminine cultures, it should be expected that in higher education, the QWL will have a stronger influence on the behavioral intention of individuals from feminine cultures. [24]

The goal of this study was to examine in detail the impact of cultural dimensions at the individual level on the main components of the TAM model in the context of e-learning in sustainable development curricula. For this, the following objectives were solved: the TAM model was applied in the context of modern Russian culture, taking into account social norms (SN), the quality of work life (QWL), the actual values of the culture of Russian youth were measured at the individual level.

In the research model, the actual behavior of a student using the technology (Use) is in direct proportion to the behavioral intention (BI). In turn, behavioral intention (BI) is directly influenced by several factors: perceived usefulness (PU), perceived ease of use (PEU), power distance (PD), uncertainty avoidance (UA), individualism (I), social norms (SN), quality of work life (QWL).

The following hypotheses were put forward.

1. Perceived usefulness (PU), perceived ease of use (PEU), behavioral intention (BI), individualism (I), masculinity/femininity (MF), social norms (SN), quality of work life (QWL), have a positive impact on behavioral intention (BI) to use electronic technologies by students.

2. Power distance (PD), uncertainty avoidance (UA) have a negative impact on behavioral intention (BI) to use electronic technologies by students.

3. Behavioral intention (BI) has a positive impact on students' use of electronic technologies.

## 2 Methods

The questionnaire was sent to 62 participants, and 54 fully completed responses were received and analyzed. All respondents had a higher technical education at the bachelor's level, experience in the construction industry for at least two years, as well as experience in participating in the implementation of sustainable development projects. The survey was attended by respondents from various fields of activity, including building management (24%), civil engineers (21%), architectures (18%), project management (17%). All participants in the study used e-learning technologies in training on sustainable development programs. They expressed their intention to improve knowledge and skills in e-learning technologies, including through additional training and courses. Participation in the study was voluntary, the participants were not offered material rewards.

Prior to the questionnaire, a pilot study was conducted to check the reliability and validity of the questionnaire. The pilot study involved four professionals who had experience with information technology learning. Some items of the questionnaire were changed following the results of the pilot study.

Questionnaire statements were used to test intended attitudes in the context of adopting technology in an objective manner when the individual is not familiar with the goal of research.

All elements (statements) used in this study were taken from literature, where they were cited as reliable and valid for measuring the constructs they are about to present. Research scales were constructed in accordance with previously adapted works. Some changes have been made to align the current context and purpose of the study.

Three constructs, perceived usefulness (PU), perceived ease of use (PEU), and behavioral intention (BI), were measured using 6, 6, and 4 items, respectively, and were adapted from the empirical study by F. Davis and related work. Scales: social norms, use of technology, measured using 4 and 4 items, respectively, were adapted from the empirical works of Ajzen I. and Fishbein M. [24] Perceived Quality of work life (QWL) included factors motivating to master electronic technology. [25]

In addition, four dimensions of culture: Individualism, Power Distance, Uncertainty Avoidance, Masculinity / Femininity were measured using six items each and were adapted from P. Dorfman and J. Howell and G. Hofstede. [26]

Examples of statements from each scale:

PU: Using the Web-based learning system will increase my learning productivity.

PEU: I find it easy to use Web-based learning system for my own purposes.

SN: Management of my university thinks that I should use the e-learning activities.

QWL: Using the Web-based learning system provide more opportunities to participate in classes.

BI: In general, I plan to use the Web-based learning system frequently to complete learning tasks.

Use: I spend a lot of time on the Web-based learning system on average per working day.

Individualism: Personal achievements are more important than group success.

Power Distance: It is frequently necessary for teachers to use authority and power when dealing with students.

Uncertainty Avoidance: It is important to closely follow teachers and procedures related to learning.

Masculinity/ Femininity: It is more important for a male student to have a professional career than it is for a female student to have a professional career.

Most of the questions in the questionnaire used a 7-point Likert scale, where respondents indicate the degree of agreement with the statement on a scale from 1 to 7 (1 - completely disagree; 2 - disagree; 3 - disagree rather than agree; 4 - difficult to answer; 5 - rather agree than disagree; 6 - agree; 7 - completely agree).

### 3 Results

Taking into account the nature of the study, the data obtained from the survey, we used the structural equation method (SEM) and partial least squares (PLS) to test the hypotheses.

Structural equation modeling (SEM) is widely used in studies of implicit (latent) variables measured indirectly through a set of observable variables. SEM-modeling allows to analyze the structure of implicit variables, to assess the correspondence between the theoretical model and empirical data. Partial least squares (PLS) analysis of SEM model includes path model estimation, measurement and structural model estimation. [27] A measurement model represents the relationship between observable data and latent variables, evaluates latent variables as the weighted sum of its explicit variables. The structural model represents the relationship between the hidden variables and estimates them using simple or multiple linear regression. [27] Data analysis was carried out using the statistical software IBM SPSS Statistics 21.0.

The measurement model was first evaluated by confirmatory factor analysis. The model was evaluated in terms of reliability, convergent and discriminant validity.

Model reliability reflects how well the variables measure the factors. For these assessments, the Cronbach alpha coefficient is most often used; in the cases of SEM-PLS models, this indicator is often supplemented or replaced by the composite reliability indicator, which should exceed 0.8. Cronbach's alpha for all scales in the measurement model was above 0.70. [28] The values obtained exceed the threshold values (see Table 1).

The validity of the construct was assessed by examining the factor loadings within a construct, as well as the correlation between the constructs. [30] Factor loadings for all variables were very satisfactory, in the expected direction, with a satisfactory critical ratio and a significance level from 0.565 to 0.991), which indicates a satisfactory coincidence of the points of outlined scales. The validity of a construct should confirm that it has a theoretical basis, is well operationalized, and has measurable indicators. The main indicator of convergent validity is the average variance extracted (AVE), which should exceed 0.5, which was met in all cases (see Table 1).

**Table 1.** Factor structure: validated measurement model.

Scale name	Cronbach's alpha	CR	AVE
Perceived Usefulness	0.952	0.969	0.881
Perceived Ease of Use	0.971	0.978	0.928
Power Distance	0.934	0.938	0.834
Uncertainty Avoidance	0.926	0.931	0.867
Individualism	0.773	0.775	0.653
Masculinity/Femininity	0.912	0.915	0.784
Social Norms	0.845	0.850	0.787
Quality of worklife	0.919	0.927	0.891
Behavioural Intention	0.928	0.933	0.776
Use	0.936	0.938	0.807

Note: CR - composite reliability, AVE - Average variance extracted, at  $p=0.001$ .

The research model can be assessed as having an acceptable discriminant validity, the correlation between each pair of variables should be less than the upper value in the column, which is the square root of the average variance extracted (AVE), according to the Fornell-Larcker test. [29] The results are detailed in Table 2, where the square roots of the AVE are shown on the main diagonal of the table. Off-diagonal items show correlations between hidden variables. According to the data presented in Table 2, it is shown that the discriminant validity of the hidden variables has been met. The discriminant validity of the measurements was also cross-checked using a cross-loading matrix. [29]

**Table 2.** Correlations between variables.

	PU	PEU	PD	UA	I	MF	SN	QWL	BI	Use
PU	0.94									
PEU	0.62	0.96								
PD	0.16	0.14	0.91							
UA	0.01	0.14	0.06	0.93						
I	0.07	0.04	0.05	0.32	0.80					
MF	0.58	0.39	0.21	0.35	0.27	0.89				
SN	0.57	0.32	0.07	0.22	0.22	0.50	0.89			
QWL	0.51	0.49	0.16	0.29	0.25	0.51	0.24	0.94		
BI	0.51	0.50	0.16	0.28	0.24	0.51	0.24	0.46	0.88	
Use	0.73	0.53	0.22	0.18	0.25	0.52	0.25	0.38	0.80	0.90

Thus, the analysis of the selected instrumentation showed that the scales used are reliable measurement method and have composite, convergent and discriminant validity (see Tables 1 and 2). The structural model is designed to test the assumed relationships. The hypotheses are tested by the Statistical Package for Social Sciences (SPSS) software.

To assess the significance of the coefficients of the path model, the bootstrapping procedure was used, which repeatedly generates new samples based on the original one. [30] The results with a detailed description of the path coefficients and t-statistics are shown in Table 3. It should be noted that hypotheses 1 of the study were confirmed (significant t-values), while hypothesis 2 was not confirmed (insignificant t-values).

The explanatory power of the structural model was estimated by observing the values of the determination coefficient  $R^2$ , that is, the proportion of the variance of the dependent variable explained by the considered dependence model.  $R^2$  is considered as a universal measure of the dependence of one random variable on many others. The  $R^2$  value for behavioral intention (BI) was 0.581. The  $R^2$  value for Use was 0.793. Both indicators significantly exceeded the minimum required value of 0.1. [30]

**Table 3.** Structural model.

	<b>Path coefficients</b>	<b>SE</b>	<b>t-statistic</b>
<b>PU - BI</b>	0.533	0.068	6.02**
<b>PEU – BI</b>	0.224	0.054	3.94*
<b>PD – BI</b>	0.043	0.034	1.19
<b>UA - BI</b>	0.031	0.067	1.68
<b>I - BI</b>	0.248	0.041	4.05**
<b>MF - BI</b>	0.219	0.047	3.72**
<b>SN – BI</b>	0.315	0.051	4.64**
<b>QWL – BI</b>	0.383	0.042	5.21**
<b>BI-Use</b>	0.904	0.008	94.47**

\*\* indicates  $p < .01$ , \* indicates  $p < .05$ . Note: SE - standard error.

Assessment of the structural model shows that all constructs within the model are connected in the expected direction, with the exception of power distance. Study hypothesis 3 was confirmed.

The results of this study and its model can be used to explain the intention and actual use of e-learning technologies by students at a Russian university.

## 4 Discussion

This study examined factors affecting the adoption of electronic technologies by students in the university of technical areas of training. It was found that perceived usefulness (PU), perceived ease of use (PEU), behavioral intention (BI), individualism (I), masculinity (M), social norms (SN), quality of work life (QWL), have positive influence on behavioral intention (BI) to use electronic technologies by students in sustainable development programs.

The findings complement data from other studies conducted using the TAM method, which demonstrated that there is a relationship between perceived usefulness, perceived ease of use and behavioral intention in technology adoption and implementation. [31] The perceived usefulness factor appears to be the most significant variable in predicting the intention to use e-learning technologies in the TAM model. [32] Many studies conducted in the context of higher education argue that perceived ease of use had a significant impact on the intention to use electronic technology [33, 34, 35] The results of this study identify behavioral intention as an important factor in the actual use of e-learning technologies. The strong and significant influence of behavioral intention on actual use is supported by empirical research [31, 33, 34]

From a practical point of view, the importance of the basic constructs of the TAM model is confirmed: perceived usefulness, perceived ease of use. Consequently, when providing distance education, organizers must ensure that the selected distance education systems adequately correspond to them.

Among the dimensions of culture examined, individualism and masculinity were found to have a significant impact on behavioral intention, while power distance and uncertainty avoidance did not have a significant impact on students' behavioral intentions to use e-learning technologies.

According to the dimension of “individualism”, the indicator for Russia was 39. This is the data of the latest research, obtained using the “Cultural compass” method. [36] This value indicates a high level of mutual support and interdependence. On the one hand, pronounced individualism presupposes certain attitudes towards learning: “the goal of teaching is to learn how to learn,” the development of self-management skills, and a responsible approach to business. On the other hand, in collectivist cultures, individuals give priority to greater agreement with social relations and the well-being of colleagues, obedience and respect. [2]

In addition, in Russia there is a high indicator of the power distance (93 points) [36] This is reflected in the great importance of status symbols, manifested in all spheres of business interaction, in the focus on clear powers to solve any problem, including in the education process. If teachers give assignments to master electronic learning technologies, students will make efforts to master them. The high level of power distance between teachers and students is combined with the characteristics of Russian culture. As a result, the "power distance" dimension did not have a significant impact on the intention to use e-learning technologies by students.

A relatively low score was obtained for the dimension "masculinity/femininity" (36 points). [36] This means that the dominant values in Russian society are concern for others and the quality of life. Mastering e-learning technologies will contribute to successful and high-quality learning, completing assignments. Dominant behavior can be acceptable when it comes from a leader but is not appreciated by colleagues.

For uncertainty avoidance, the indicator for Russia is 39. [36] This means that Russians feel a serious threat due to ambiguous situations, preferring detailed planning and instruction, contextual and reference information. Since the development of e-learning technologies is provided for by the curriculum, it occurs purposefully, it is not a surprise for students. Therefore, the measurement of "uncertainty avoidance" did not significantly affect the intention to use e-learning technologies by students.

The revealed influence of cultural dimensions also suggest that organizers of the educational process may need to balance the instrumental, personal, or social factors they focus on in order to stimulate the adoption of electronic technology, depending on prevailing local cultural values. The inclusion of social norms and quality of work life, in addition to a set of individual differences in cultural dimensions, has led to a better understanding of the factors that can facilitate or hinder the adoption of e-learning technologies. The results obtained confirmed the importance of social norms in addition to the parameters of the technology itself. This highlights the need to consider strategies for technology adoption that provide support from the wider social environment.

Quality of work life was included in this study based on suggestions from previous authors. [23]. In addition, the survey results confirm that the quality of work life is an important factor in the implementation of e-learning. Our research emphasizes that the acceptance of e-learning technologies should be focused on social and cultural factors, and not just on the implementation of a technological solution.

## 5 Conclusions

The requirements for distance e-learning involve educational approaches and theories of education, and with a reasonable use of resources, it is possible to find solutions to meet the needs of higher education for sustainable development.

Distance e-learning at the university is a complex and multifaceted process, but also has a wide range of educational opportunities. Distance e-learning focuses on self-education, learning, does not depend on place and time, selects content according to interests, recognizes individual differences of students, makes it possible to visualize educational material using multimedia, helps to establish joint learning, quick feedback and evaluate education process. All this helps to solve many problems in the organization of the educational process, to overcome infrastructural limitations.

Like any study, this study has limitations. First, our sample was monocultural; it consisted of students at a technical university. Future research can be carried out in a multicultural context, with the participation of representatives of different groups of students (for example, students of different fields of training, different levels of education), in different organizational contexts, with other e-learning tools. The construct "social norms", which we

included in this study, combined the influence of different social groups: teachers, students. But group norms can be separated and studied separately. Finally, the influence of other cultural characteristics in the context of distance e-learning can be studied.

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