A Comparative Study of Engineering and Business Students' Attitude to e-Business Application

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Keywords: e-Business Application, Students' Attitude, Comparative Study, Interpretive Paradigm.

Abstract: e-Business applications in higher education enrich students' competence in both entrepreneurship and Information and Communication Technology. However, little attention has been paid to a comparative study of engineering and business students' attitude to e-Business application. The aim of the paper is to compare engineering and business students' attitude to e-Business application underpinning elaboration of a hypothesis. The meaning of the key concepts of *attitude* and *criteria* is studied. Moreover, the study demonstrates how the key concepts are related to the idea of *e-Business application* and shows a potential model for development, indicating how the steps of the process are related following a logical chain: attitude and its criteria → empirical study within multicultural environments → conclusions. The results of the present research show that both business and engineering students' attitude to e-Business application is positive. Directions of further research are proposed.

1 INTRODUCTION

Entrepreneurship facilitates the prosperity of the modern society in general and the sustainability of contemporary economics in particular as entrepreneurship has been adopting a two-fold role such as

- from the social perspective, entrepreneurship promotes the innovative and competitive development of society, and
- from the individual perspective, entrepreneurship contributes to the individual's employability and career option.

For the increase of enterprise efficiency in the digital era, entrepreneurship employs e-Business applications as depicted in Figure 1.

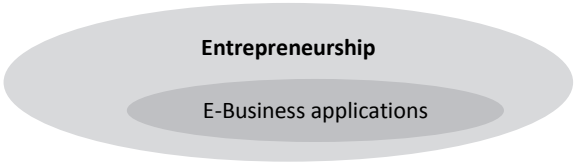

Figure 1: The relationship between entrepreneurship and e-Business application.

Due to the two-fold role of entrepreneurship in the modern world, entrepreneurship education as well as e-Business applications have been widely introduced into higher education.

e-Business applications in higher education are demonstrated in Figure 2 (Zaščerinska and Ahrens, 2013).

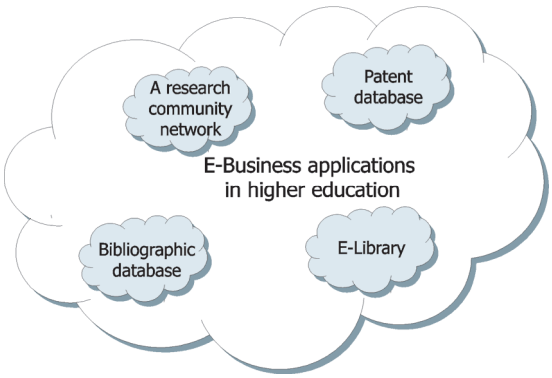

Figure 2: e-Business applications in higher education.

In higher education, two dimensions of e-Business application, namely business (university studies, etc) and entertainment (chats, etc), are outlined.

e-Business applications in higher education enrich students' competence in both entrepreneurship and Information and

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Communication Technology. Students' entrepreneurship and digital competences are of great importance as they serve as

- two of eight key competences outlined by the European Commission for lifelong learning (European Commission, 2004), and
- e-Business application's condition, factor and evaluation criterion (Surikova, 2007).

Competence consists of knowledge, skills and attitudes (European Commission, 2004) as shown in Figure 3.

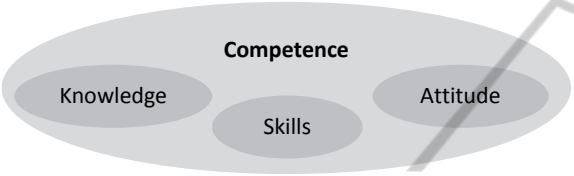

Figure 3: Elements of competence.

The elements of competence, namely knowledge, skills and attitude, are inter-related. Students' negative attitude to e-Business application fails to promote the increase in the level of students' knowledge and skills in e-Business application, and competence, in general. In contrast, students' positive attitude to e-Business application contributes to the enrichment of the level of students' knowledge and skills in e-Business application and competence, in general.

Students' attitude to e-Business application in higher education has been investigated via analysis of engineering students' attitude to the Digital Social Media module that includes e-Business applications (Ahrens et al., 2012).

However, little attention has been paid to a comparative study of engineering and business students' attitude to e-Business application.

The aim of the paper is to compare engineering and business students' attitude to e-Business application underpinning elaboration of a hypothesis. The meaning of the key concepts of *attitude* and *criteria* is studied. Moreover, the study demonstrates how the key concepts are related to the idea of *e-Business application* and shows a potential model for development, indicating how the steps of the process are related following a logical chain: attitude and its criteria → empirical study within multicultural environments → conclusions.

The present research of the present contribution is considered within the System-Constructivist Theory. The System-Constructivist Theory is introduced as the New or Social Constructivism Pedagogical Theory. The System-Constructivist Theory serves as the basis of the methodological background of the present contribution. The System-Constructivist Theory is formed by

- Parsons's System Theory (Parsons, 1976) on any activity as a system,
- Luhmann's Theory (Luhmann, 1988) on communication as a system,
- the Theory of Symbolic Interactionalism (Mead, 1973),
- the Theory of Subjectivism (Groeben, 1986).

The System-Constructivist Theory implies the dialectical principle of the unity of opposites that contributes to the understanding of the relationship between external (social, social interaction, teaching, etc) and internal (individual, cognitive activity, learning, etc) perspectives as the synthesis of external and internal perspectives (Bassus and Zaščerinska, 2012). In comparison, the Constructivism Theory focuses on the internal perspective, the Social Constructivist Theory – on the external perspective as well as on the balance between the balance between the external and internal perspectives (Bassus and Zaščerinska, 2012).

The System-Constructivist Theory and, consequently, the System-Constructivist Approach to learning introduced by Reich (Reich, 2005) emphasize that human being's point of view depends on the subjective aspect:

- everyone has his/her own system of external and internal perspectives (Ahrens and Zaščerinska, 2010) that is a complex open system (Rudzinska, 2008), and
- experience plays the central role in the knowledge construction process (Maslo, 2007).

Therein, the subjective aspect of human being's point of view is applicable to the present research on this comparative study of engineering and business students' attitude to e-Business application.

2 THEORETICAL FRAMEWORK

Students' attitude is a criterion of e-Business application in higher education. It should be noted that criteria serve to structure, assess and evaluate while indicators determine developmental dynamics (Lasmanis, 2003; Špona and Čehlova, 2004), and constructs differentiate a variable which is not directly observable. Criteria, indicators and constructs are determined via analysis of definition of the research object, structure of the research object and factors (Špona and Čehlova, 2004).

Attitude is identified as a combination of evaluative judgements about a phenomenon (Crites et al., 1994). Traditionally, attitude is differentiated into positive, neutral or negative as illustrated in Figure 4.

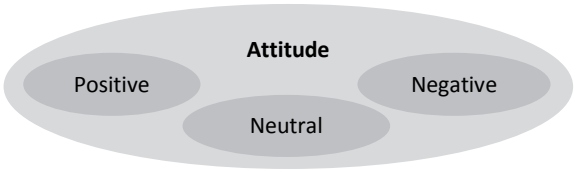

Figure 4: Differentiation of attitude.

This differentiation of attitude is considered as levels of attitudes shown in Table 1.

Table 1: Attitude as a Criterion of e-Business application and levels of attitude.

Criterion	Levels		
	Level 1	Level 2	Level 3
	low	optimal	high
	1	2	3
Students' evaluative judgements on e-Business application	*Negative*	*Neutral*	*Positive*

Attitude is rooted in emotions. Thus, emotions and attitude are inter-related as depicted in Figure 5.

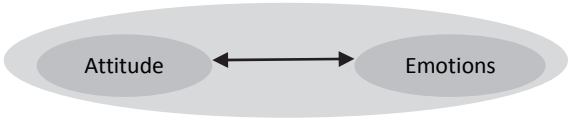

Figure 5: The relationship between attitude and emotions.

However, emotions refer to psychology, and attitude – to pedagogy. Therein, psychological processes provide the basis for pedagogical developments.

Emotions defined as nerve impulses ensure this faster reaction to a problem situation as emotions encourage for acting by use of an immediate plan of action (Kriumane, 2013). The main thing is that emotional processes and states have their own special positive development in man (Leont'ev, 1978). This must be especially emphasized in as much as the classical conceptions of human emotions as "rudiments" coming from Darwin, consider their transformation in man as their involution, which generates a false ideal of education, leading to the requirement to "subordinate feelings to cold reason" (Leont'ev, 1978). Emotions are not only feelings, but also other elements, such as expressions in the face or the voice, physiological changes, and changes in action tendencies or action readiness (De Vierville, 2002). Emotions fulfill the functions of internal signals, internal in the sense that they do not appear directly as psychic reflection of objective activity itself (Leont'ev, 1978). The special feature of emotions is that they reflect relationships between motives (needs) and success, or the possibility of success, of realizing the action of the subject that responds to particular motives (Leont'ev, 1978). Further on, emotions are relevant to the social activity and not to individual actions or operations that realize it (Leont'ev, 1978). As a result emotions are not subordinated to activity but appear to be its result and the "mechanism" of its movement (Leont'ev, 1978).

For the cultural dimension of e-Business application, it is important that the experience and expression of emotions depends on learned convictions or rules, and to the extent that cultures differ in the way they talk about and conceptualize emotions, how they are experienced and expressed will differ in different cultures as well (Cornelius, 1996). Consequently, considering the discipline culture, as emotional practitioners, students can make the process of e-Business application exciting or dull (Hargreaves, 2000). Moreover, students' interactions can be crucial in developing students' academic self-concept and enhancing their motivation and achievement (Komarraju et al., 2010). Thereby, on the one hand, emotion reflects the culture trait of a person (Harré, 1986), and, on the other hand, the emotions are social constructions (Averill, 1980).

Analysis of the inter-relationship between attitude and emotions contributes to the identification of attitude's indicators and constructs presented in Table 2.

Table 2: Attitude's indicators and constructs.

Criterion	Indicators	Constructs
Students' evaluative judgements on e-Business application	Verbal expression	A word, sentence, etc
	Non-verbal expression	Face expression, body language, mimicry, etc
	Cultural expression	Cultural habits

Such constructs of verbal expression as a word or sentence may express a positive or negative meaning. For example, "excellent" is considered as a

construct that demonstrates a positive attitude, "moderate" – neutral, and "bad" - negative.

Regarding non-verbal expression, smiling face means positive attitude, a neutral voice tone – neutral attitude, crossing one's arms – negative attitude.

Such constructs of cultural expression as applauding demonstrates positive attitude, listening without a comment – neutral, and turning one's back to a colleague – negative.

3 EMPIRICAL STUDY

The present part of the contribution demonstrates

- the design of the empirical research,
- survey results, and
- findings of the comparative study.

The design of the present empirical research comprised the purpose and question, sample and methodology of the present empirical study.

The guiding question of the empirical study was as follows: are there any similarities and difference between engineering and business students' attitude to e-Business application?

The purpose of the empirical study was to compare engineering and business students' attitude to e-Business application underpinning elaboration of a hypothesis.

The present empirical study involved

- 13 second-year bachelor part-time students of the *Business Management* programme of the Northern Business School, Neumuenster, Germany, in January 2014, and
- 23 engineering students of Baltic Summer School *Technical Informatics and Information Technology* held at Vilnius Gediminas Technical University, Vilnius, Lithuania, July 20-August 4, 2013.

The respondents of 13 second-year bachelor part-time students of the *Business Management* programme of the Northern Business School, Neumuenster, Germany, in January 2014 included 7 male and 6 female students. The age of students ranged between 20 and 50. All the students obtained working experience in different business fields. Although the students studied in the same group, they represented different cultures, namely, German, Polish and Russian.

The respondents of 23 engineering students of Baltic Summer School *Technical Informatics and Information Technology* held at Vilnius Gediminas Technical University, Vilnius, Lithuania, July 20-August 4, 2013 involved four female and 19 males. The age of the respondents differentiated from 22 to 35. All 23 students had got Bachelor Degree in different fields of computing. Working experience of the students was different, too. The students represented the cultures of Lithuania, Russia, Poland, Pakistan, France, Estonia, Serbia, Czech Republic, Finland, Ireland, Germany, Mexico, Georgia and Ethiopia.

Therefore, the sample is multicultural as the respondents with different cultural backgrounds and diverse educational approaches were chosen. Students' different cultural and educational experience emphasized the significance of each student's contribution to the analysis of their attitude to e-Business application. Thus, the groups' socio-cultural context (age, cultural and educational experience, mother tongue, etc.) is heterogeneous.

The interpretive paradigm was used in the empirical study. The interpretive paradigm aims to understand other cultures, from the inside through the use of ethnographic methods such as informal interviewing and participant observation, etc (Taylor and Medina, 2013). Interpretive paradigm is characterized by the researcher's practical interest in the research question (Cohen et al., 2003). Researcher is the interpreter.

Explorative research has been used in the empirical study (Mayring, 2007). Explorative research is aimed at developing hypotheses, which can be tested for generality in following empirical studies (Mayring, 2007). The explorative methodology proceeds from exploration in Phase 1 through analysis in Phase 2 to hypothesis development in Phase 3 as demonstrated in Figure 6 (Ahrens et al., 2013).

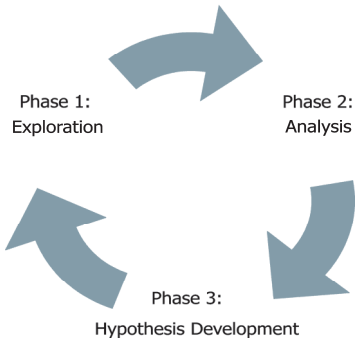

Figure 6: Methodology of the explorative research.

Phase 1 *Exploration* is aimed at data collection. Phase 2 *Analysis* focuses on data processing, analysis and data interpretation. Phase 3 *Hypothesis Development* ensures analysis of results of the

empirical study as well as elaboration of conclusions and hypotheses for further research.

In order to analyse the students' feedback regarding their attitude to e-Business application, the informal structured interviews were based on the following questions:

- Question 1: Do you mostly use e-Business applications for your university studies, working in a company and/or running your own business?
- Question 2: Do you mostly use e-Business applications for entertainment (chats, games, books, films, music)?

Only verbal expression of engineering and business students' attitude to e-Business application was taken into consideration.

The evaluation scale of five levels for Question 1 and 2 was given, namely, strongly disagree "1", disagree "2", neither disagree nor agree „3", agree "4", and strongly agree "5". The evaluation scale was transformed into the level system as illustrated in Table 3.

Table 3: Indicator and levels of students' attitude to e-Business application.

Indi-ca-tor	**Levels**				
	Level 1	**Level 2**	**Level 3**	**Level 4**	**Level 5**
	very low	**low**	**ave-rage**	**opti-mal**	**high**
	1	**2**	**3**	**4**	**5**
Ver-bal ex-pres-sion	*Stron-gly dis-agree* *Very negati-ve*	*Dis-agree* *Negati-ve*	*Nei-ther disag-ree nor agree* *Nei-ther negati-ve nor positi-ve*	*Agree* *Positi-ve*	*Stron-gly agree* *Very positi-ve*

The business students' results of Question 1 (e-Business application for university studies) and Question 2 (e-Business application for entertainment) used in the informal structured interviews are demonstrated in Figure 7 where

- the vertical numbers show five levels to measure students' attitude to e-Business application, and
- the horizontal numbers present the code number of the business students who participated in the survey.

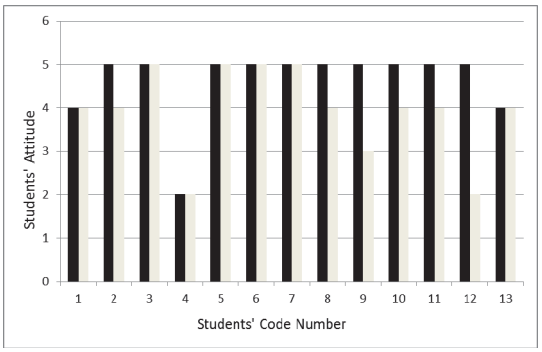

Figure 7: The business students' results of Question 1 (in black) and Question 2 (in gray).

The business students' results of Question 1 (e-Business application for university studies, etc) reveal that

- one business student's evaluation of his/her attitude to e-Business application for university studies refers to the low level,
- two business students' evaluation of their attitude to e-Business application for university studies refers to the optimal level,
- 10 business students' evaluation of their attitude to e-Business application for university studies refers to the high level.

The results of Question 2 (e-Business application for entertainment) demonstrate that

- two business students' evaluation of their attitude to e-Business application for entertainment refers to the low level,
- one business student's evaluation of his/her attitude to e-Business application for entertainment refers to the average level,
- six business students' evaluation of their attitude to e-Business application for entertainment refers to the optimal level, and
- four business students' evaluation of their attitude to e-Business application for entertainment refers to the high level.

In comparison, the engineering students' results of Question 1 (e-Business application for university studies) and Question 2 (e-Business application for entertainment) used in the informal structured interviews are shown in Figure 8.

The engineering students' results of Question 1 (e-Business application for university studies) reveal that

- one engineering student's evaluation of his/her attitude to e-Business application for university studies refers to the low level,
- three engineering students' evaluation of their attitude to e-Business application for university studies refers to the average level,

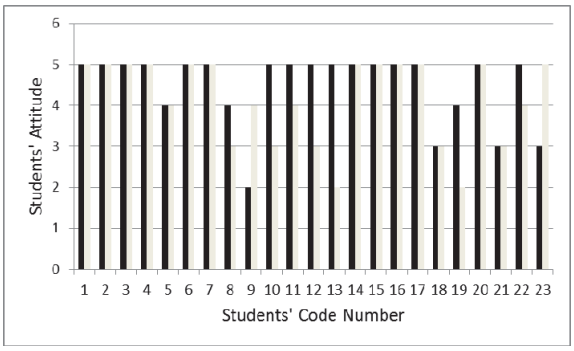

Figure 8: The engineering students' results of Question 1 (in black) and Question 2 (in gray).

- three engineering students' evaluation of their attitude to e-Business application for university studies refers to the optimal level,
- 16 engineering students' evaluation of their attitude to e-Business application for university studies refers to the high level.

The engineering students' results of Question 2 (e-Business application for entertainment) demonstrate that

- two engineering students' evaluation of their attitude to e-Business application for entertainment refers to the low level,
- five engineering student's evaluation of their attitude to e-Business application for entertainment refers to the average level,
- four engineering students' evaluation of their attitude to e-Business application for entertainment refers to the optimal level, and
- 12 engineering students' evaluation of their attitude to e-Business application for entertainment refers to the high level.

The comparison of the results of Question 1 (e-Business application for university studies) shows that the majority of both business and engineering students' evaluate their attitude to e-Business application for university studies to be of the high level. The comparison of the results of Question 2 (e-Business application for entertainment) demonstrate that the majority of

- business students evaluate their attitude to e-Business application for entertainment at the optimal level, while
- engineering students' evaluation of their attitude to e-Business application for entertainment refers to the high level.

The data were processed applying *Excel* software.

Frequencies of the business and engineering students' answers were determined in order to reveal students' attitude to e-Business application as shown in Table 4.

Table 4: Frequency of the students' answers.

Question	Levels	Students' group	Number of answers	Percentage
Question 1	very low	business	0	0%
		engineering	0	0%
	low	business	1	8%
		engineering	1	4%
	average	business	0	0%
		engineering	3	13%
	optimal	business	2	15%
		engineering	3	13%
	high	business	10	77%
		engineering	16	70%
Question 2	very low	business	0	0%
		engineering	0	0%
	low	business	2	15%
		engineering	2	9%
	average	business	1	8%
		engineering	5	22%
	optimal	business	6	46%
		engineering	4	17%
	high	business	4	31%
		engineering	12	52%

The comparison of the frequencies of business and engineering students' answers to Question 1 (e-BUSINESSE-Business application for university studies) shows that the majority of both business and engineering students' evaluate their attitude to e-Business application for university studies to be of the high level (77% and 70% respectively). The comparison of the frequencies of business and engineering students' answers to Question 2 (e-Business application for entertainment) demonstrate that the majority of

- business students evaluate their attitude to e-Business application for entertainment at the optimal level (46%), while
- engineering students' evaluation of their attitude to e-Business application for entertainment refers to the high level (52%).

Further on, the mean results determine the high level of both business and engineering students' attitude to e-Business application for university studies (4.6 and 4.5 respectively), and the optimal level of the business students' attitude to e-Business application for entertainment (3.9) as well as the high level of the engineering students' attitude to e-Business application for entertainment (4.5) as shown in Table 5.

The findings of the empirical study allow concluding that both business and engineering students demonstrated the high level of attitude to

Table 5: Mean results.

Ques-tion	Levels	Students' group	Num-ber of answers	Percen-tage
Ques-tion 1	very low	business	0	Business students 4.6
		engineering	0	
	low	business	1	
		engineering	1	
	average	business	0	
		engineering	3	Enginee-ring students 4.5
	optimal	business	2	
		engineering	3	
	high	business	10	
		engineering	16	
Ques-tion 2	very low	business	0	Business students 3.9
		engineering	0	
	low	business	2	
		engineering	2	
	average	business	1	
		engineering	5	Enginee-ring students 4.5
	optimal	business	6	
		engineering	4	
	high	business	4	
		engineering	12	

e-Business application for university studies (4.6 and 4.5 respectively). As well as business students reveal a lower level of attitude to e-Business application for entertainment (3.9), in comparison to engineering students' attitude to e-Business application for entertainment (4.5).

The summarizing content analysis (Mayring, 2004) of the data reveals that

- there is no difference in both business and engineering students' attitude to e-Business application for university studies (the high level), and
- there is a difference of one level in business and engineering students' attitude to e-Business application for entertainment (the optimal and high level respectively).

4 CONCLUSIONS

The theoretical findings on the analysed inter-relationship between attitude and emotions within the present research allow the paper's authors to determine indicators and constructs of students' attitude to e-Business application.

The findings of the present empirical study allow drawing conclusions that both business and engineering students' attitude to e-Business application is positive. Students' positive attitude to E-Business application is considered as a favourable opportunity for the increase of the level of students' knowledge and skills in e-Business application.

The following hypothesis has been formulated: students' positive attitude to e-Business application promotes the increase of the level of students' knowledge and skills in e-Business application if a favourable educational (teaching, peer-learning and learning) environment is organized.

The present research has limitations. The inter-connections between e-Business application, students' attitudes and emotions have been set. Another limitation is the empirical study conducted by involving only the business and engineering students. Therein, the results of the study cannot be representative for the whole area. Nevertheless, the results of the research, namely, indicators, constructs and levels of students' attitude to e-Business application, may be used as a basis of analysis of students' attitude to e-Business application in other institutions.

Further research tends to implement empirical studies in other students' groups. The search for relevant methods for evaluation of students' attitude to e-Business application is proposed. Further empirical studies could be focused on the analysis of other indicators of attitude, namely, non-verbal and cultural expression. A comparative research of other countries could be carried out, too.

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