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First, and the most important, we would like to wish you all the best in such a complicated time the world is in now. As most of the social and educative face-to-face activities have been cancelled in many countries, education institutions must have reacted quickly to adopt new forms of education. Education is a continuous process, which does not stop when we successfully terminate another educational level gaining another diploma. We learn throughout the whole life. The same can be applied to the education of these days.

The courses cannot stop for a couple of weeks due to all set of reasons, such as legal, administrative, logistics, among others. Right now, it is the time when online education gets the highest importance for all education levels. The shift from face-to-face education to distance learning, in forms from the simple online support of face-to-face course to courses completely taught online, is not new. This process began many years ago. However, this shift was accelerated in the speed of light during the last couple of weeks. In such a short period, teachers had to change their mindset and routines, step out of their comfort zones, and adapt their courses. In many cases, this adaption was not supported by any detailed instructions and, thus, many were pioneering the way, more or less, using the trial-and-error method. However, as both the teachers and students understand the current situation, patience is the key in this process as it is difficult to change our routines.

A simple question arises: What will be the impact of the current shift to distance teaching/learning on education processes in future? Will the distance learning will begin a norm? It is hard to say now. To make valid conclusions, we must observe the consequences to be able to say the pros and cons of any change. However, there is a well-known shift of the youngest generations towards information technologies, as the current students want to have instant access to information, being connected 24 hours a day. Therefore, the current worldwide situation can be a vital push that would help to align the education with students' needs. Next months will show…

As education cannot stop, the same can be said about science. We are glad that we can present you the first issue of the year 2020 (Vol. 13, No. 1). In this newest issue, we would like to present you four articles from diverse set of authors from Czech, Indonesian and Iranian education institutions. The common topic that, to some extent, covers all four articles is related to structural changes in teaching and education that lead to higher educational quality.

In the first article, Kateřina Berková, Dagmar Frendlovská, Jan Pospíšil Závodný, Hana Vojáčková and Dana Kolářová from College of Polytechnics in Jihlava and University of Economics, Prague present results of research into entrepreneurship education in economic and noneconomic study programs based on students' perception. The results indicate that no significant differences in attitudes concerning entrepreneurship among students of economic and non-economic programs exist. Similarly, the authors did not find a relation between students' interest in conducting business, having preconceptions to start a business and subjective evaluation of one's ideas and their knowledge of entrepreneurship. One of the main problems regarding beginning own business is high risks and uncertainty of business earnings. Students perceive that they do not have enough knowledge and are thus afraid of starting a business. Therefore, to promote entrepreneurship in society, students need leadership support in the form of new platforms to ensure the development of entrepreneurship education.

In the second article, Eva Samková from University of South Bohemia focused on issues related to the implementation of formative assessment methods into inquiry-based teaching by means of issues related to solving twelve multiple-step arithmetic word problems based on operations with natural and rational numbers. The research was conducted with four consecutive groups of participants that differed in the form and extent of a mathematics course that the participants attended just before data collection. The participants in the research were students of two different study programs at the Faculty of Education, University of South Bohemia in *České* Budějovice. Within both study programs, the participants were trained to teach all school subjects at primary school level (pupils from 6 to 11 years of age). Six notions are introduced in the paper: majority, minority and even solution procedures, and majority, minority and mixed solvers. All the six notions are illustrated in the paper by samples of solution procedures and diagrams of relative frequency.

The third article from Ibrahim Safari, Mehran Davaribina and Iraj Khoshnevis from Islamic Azad University in Iran examined the influence of English as a Foreign Language (EFL) teachers' self-efficacy, job satisfaction, and reflective thinking on their professional development. The analysis included two-hundred and twelve Iranian EFL teachers from various universities, language institutes and schools. They were requested to answer Teachers' Sense of Efficacy Scale, The Minnesota Satisfaction Questionnaire, Reflective Thinking Scale, and Professional Development Questionnaire as the main data collection instruments. The findings revealed that self-efficacy and job satisfaction positively predict teachers' professional development, where self-efficacy has more predictive power compare to job satisfaction. The weaker predictive power of job satisfaction is linked to its primary impact on reflective activities, which is a sub-scale of professional development.

In the last article in this issue, the authors Hety Budiyanti, Shine Pintor Siolemba Patiro, Muhammad Djajadi and Sri Astuty from State University of Makassar and Universitas Terbuka in Indonesia analysed the application of service quality theory to explain and predict the satisfaction, trust, and

motivation of participants at leadership education and training programs in Indonesia. Results detected that five dimensions of the service quality have a positive and significant effect on participants' satisfaction. Regarding the participants' motivation, service quality has an indirect influence on motivation through satisfaction. Furthermore, service quality has a positive effect on participants' satisfaction, which in turn has a potential impact on their motivation. The authors then conclude that service quality and satisfaction play a significant role in participants' motivation.

We would like to thank all authors who have submitted their manuscripts to ERIES Journal and special thanks to all reviewers for their endless effort in revising the manuscripts. We would also like to thank all teachers, educators and people involve in the education administration all around the world for their continuous effort to deliver the highest teaching standards in these difficult times. We hope that all our readers will find this first issue of the year 2020 interesting. We also hope that the published articles will positively contribute to the field of efficiency and responsibility in education and attract a wide audience of readers.

Sincerely

Martin Flégl
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CONTENT

Full research paper

EDUCATION TOWARDS ENTREPRENEURIAL CAREERS IN A CZECH COLLEGE: AN EMPIRICAL STUDY

Kateřina Berková[1]✉
Dagmar Frendlovská[1]
Jan Pospíšil Závodný[1]
Hana Vojáčková[2]
Dana Kolářová[3]

[1] Department of economic studies, College of Polytechnics Jihlava, Czech Republic

[2] Department of technical studies, College of Polytechnics Jihlava, Czech Republic

[3] Department of Economic Teaching Methodology, Faculty of Finance and Accounting, University of Economics, Prague, Czech Republic

✉ katerina.berkova@vspj.cz

ABSTRACT

The article presents the results of research into entrepreneurship education in economic and non-economic study programmes of the College of Polytechnics Jihlava (n = 104). The College represents a regional public college of professional orientation in the Vysočina Region, where the business potential is relatively high. Significant differences in attitudes concerning entrepreneurship among students of economic and non-economic programmes have not been proven. As well the correlation between attitudes (interest in conducting business, having preconceptions to start a business and subjective evaluation of one's own ideas) and the students' knowledge of entrepreneurship was not significantly demonstrated. Despite these insignificant differences, there have been links in students' attitudes. Students of both programmes have a great interest in doing business even at the cost of having preconception to start a business. Above all, the high risk and uncertainty of business earnings are perceived very negatively. They also admit that they do not have enough knowledge and are thus afraid of starting a business, even though they have their own business ideas. Therefore, it is desirable to focus on new platforms for the development of entrepreneurship education and thus support the potential of students.

KEYWORDS

Entrepreneurship education, economic and non-economic study programmes, attitude towards business, business education platforms

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Highlights

- *The development of entrepreneurship education is important to support students' entrepreneurial potential.*
- *There are no differences in attitudes towards entrepreneurship among students in different programmes.*
- *Students' attitudes and knowledge about starting a business do not correlate.*

INTRODUCTION

Some of the well-known and successful world entrepreneurs did not graduate from college. As an example, we can list names like Richard Branson, founder of Virgin Group, Steve Jobs, co-founder of Apple Inc., or Mark Zuckerberg, founder of Facebook. Many young people are trying to go along the same path today, but often without the expected success which was achieved by their famous precursors (Zhang, 2014). An exaggerated willingness to give up a college degree for the sake of business success could be caused by several reasons. First of all, it is given by the success stories of the mentioned entrepreneurs, and not just them. Many successful entrepreneurs argue that they did not need a college education for their success (Buenstorf, Nielsen and Timmermans, 2017). As another reason, the inborn and fixed personality traits of students with business intentions could be mentioned (Gartner, 1988). If the traits like willingness to take a risk, need for achievement or the locus of control and desire for autonomy, are important for the decision to become an entrepreneur on one hand (Cromie, 2000), on the other hand, those traits will also negatively interfere with the potential for successful college graduations (Parker, 2004). However, as a very serious reason, actual quality, structure and added value of entrepreneurial education programmes must be mentioned (Cho, 2017).

For the universities, especially for those economically oriented, entrepreneurship is one of the main fields of research (Chen, 2013). Relatively strong orientation on entrepreneurship research in the Czech Republic is partly given historically since Czech born scientist Josef Alois Schumpeter started related research works in the 1930s (Schumpeter, 1934). Entrepreneurship is not just an economic or management discipline since it has been broadly examined in the point of view of several other disciplines including psychology, sociology, and anthropology (Simpeh, 2011). It can be assumed that universities are an inexhaustible source of important and valuable theoretical information relevant for successful entrepreneurship. But the question, whether they are able to transfer them effectively to the students, remains unanswered.

Stress on the importance of entrepreneurship education is given worldwide (Lima et al., 2015). In this direction, it is not a coincidence, that the United Nations Conference on Trade and Development called entrepreneurship as an important item in promoting the development of countries (UNCTAD Secretariat, 2011). The issue of education as the development factor of students´ entrepreneurial intentions should be examined at least from the two points of view. On one side, there is classical education related to the area of educational focus of the colleges. On the other side, special entrepreneurship education programmes should be mentioned (Fayolle, Gailly and Lassas-Clerc, 2006).

There are some pieces of evidence that college education has a significant negative effect on students' entrepreneurial intention, as well as on self-efficacy (Lima et al., 2015). It may seem that higher education is a barrier in chasing the entrepreneurship. In this case, however, it is rather about bad judgment. As statistics shows, 80 percent of new businesses will fail in its first 5 years (Zhang, 2014), the issue can have a positive explanation. In the Czech Republic, start-ups are developing more and more as a form of business support. It is about the support of start-ups. There were 2,100 start-ups at the end of 2017. Ministry of Industry and Trade has not published new data yet. Most of these businesses (70%) are still in the early stages of business. The success rate of these new businesses is 10% (Ministry of Industry and Trade, 2017). Education is giving the students the time to think and critically evaluate their business intentions. Thanks to their own sorting process, students are more conscious of what an entrepreneurial career is and what it would demand of them (Lima et al., 2015). Anyhow, the overall impacts of entrepreneurship education are positive for both the students as the society in whole (von Graevenitz, Harhoff and Weber, 2010).

If college education has a moderating impact on students´ entrepreneurial intentions, it has almost no distinguishable impact on personality traits of the students (Lima et al., 2015). Actually, these are the most important factors in the development of students' entrepreneurship (Murugesan and Dominic, 2012). Previous research shows a strong link between the business creation and its success with numerous personality constructs, traits and characteristic (Rauch and Frese, 2007). One of the most frequently cited characteristics of entrepreneurs referring to a greater than average need for achievement is among the most frequently identified qualities (e.g. Rauch and Frese, 2007; Miner, 2000; Stewart and Roth, 2007). Interestingly, entrepreneurs are also often found to be highly motivated to obtain feedback on their performance (Rauch and Frese, 2000). Persons with entrepreneurial interests also enjoy interacting with other people, but they are not emotionally dependent on them (Decker, Calo and Weer, 2012). Naturally, others more common traits like a high level of goal-setting behaviour and perseverance (van Eeden, Louw, and Venter, 2005), placing greater value on autonomy, freedom, and independence (Rauch and Frese, 2007), or propensity to take moderate-level risks (Kreiser, Marino and Weaver, 2002) have been identified as characteristic of entrepreneurs. However, it is necessary to draw attention to the fact, that despite the high occurrence in the literature, the "Big Five" (McCrae and John, 1992) is not suitable for measuring entrepreneurial abilities (Rauch and Frese, 2000; Decker, Calo and Weer, 2012).

In contrast, some authors argued that though the personality traits play a crucial role by predisposing someone to become an entrepreneur, in fact, the entrepreneurial skills can be taught (Neck et al., 1999). However, this is again related to the quality and content of education. In general, it is possible to say that good education for entrepreneurship should be composed of such elements that can accentuate theories and principles of entrepreneurship in order to develop students' cognitive skills (Fiet, 2001). However, due to the expected necessity of real-life experiences, the practice-based approach is more important (Ireland et al., 2001).

Specific entrepreneurship education programmes can fulfil this necessity. Some studies (Fayolle, Gailly and Lassas-Clerc, 2006; Hatten and Ruhland, 1995) suggest that special training programmes, teaching methods or even student training companies can have a strong measurable impact on the entrepreneurial intention of the students, but they have not a significant impact on students' perceived behavioural control. Thus, trying to create a definition of best education towards the entrepreneurship seems very complicated. Only general recommendations can be quoted. Entrepreneurship education should include educational areas such as general business knowledge, including market analysis and planning, pricing strategies, financial analysis, leadership, human resource management theory and other business theory and skills (Block and Stumpf, 1992). At the same time, students should be trained to make decisions in an uncertain environment, as well as on how to select and manage new businesses (Ronstadt, 1985). Important is also the finding that entrepreneurship education requires practical learning based on experience rather than traditional lecture methods (Lee et al., 2018). As a conclusion, it could be stated that entrepreneurship teaching is important to both a theoretical as well as a practical aspect of entrepreneurship (Anderson and Jack, 2008).

Research Problem and Objective

The aim of the study is to analyze the current state of entrepreneurship education at the College of Polytechnics Jihlava. The topic is chosen for its importance and with regard to the potential of the city of Jihlava and the Vysočina Region in the development of young people's entrepreneurship potential, which has not been used so much so far. The topic

is so important that in the Vysočina Region it establishes the idea of developing start-ups as a tool to support young people's entrepreneurship. This reason has motivated researches for conducting the research, and thus this study, which is focused on the interest in entrepreneurship for the time being among students of economic and non-economic fields of the regional university, has developed. The selection of the institution was due to the condition of doing research at a practically oriented polytechnic institution providing more different fields of study. There are only two polytechnic colleges in the Czech Republic, namely in the Vysočina Region and the South Bohemian Region. The Vysočina Region was chosen for this research also because the researchers know very well the education system at the College of Polytechnics Jihlava, as they work there as teachers. Another reason for the selection was the potential of the Vysočina Region for the development of entrepreneurship. Conducting the research was also motivated by an international empirical study (Lima et al., 2015), which publishes the survey results of 25,000 respondents, concluding that interest in entrepreneurship is negatively correlated with tertiary education. Given the need to represent economic and non-economic programmes in the research sample, research was conducted across the college programmes. The research was conducted on the basis of a questionnaire to find out: (1) how the attitudes concerning entrepreneurship among students of economic and non-economic programmes differ; (2) what students' preconceptions of starting a business are and how they restrict them at the start. The relation between the interest in starting a business among students and their knowledge of starting a business is further explored. Following research hypotheses are the subject to verification:

- H1: The interest in entrepreneurship is higher for students of economic programmes than for students of non-economic programmes.
- H2: Preconceptions as a barrier for starting a business are perceived by students of economic programmes more than by students of non-economic programmes.
- H3: Economic programme students differ from non-economic programme students by having a business idea and knowing exactly how to conduct business.
- H4: Students' attitudes concerning entrepreneurship and knowledge about conducting a business correlate.

The research represents an initial survey with the ambition of prospective data expansion and inter-university comparison of entrepreneurship education in the Czech Republic. The article provides empirically-based knowledge that is important for developing tools (teaching methods and platforms) to promote entrepreneurship during education.

MATERIALS AND METHODS

The research was conducted from October to November 2018 across the study programmes of the College of Polytechnics Jihlava. The survey was aimed at students who were involved in the project "Starting for Development of Students' Entrepreneurial Potential of the College of Polytechnics Jihlava". The project involved 104 students. All these students also participated in the research that is why the number of respondents was considered as a representative sample only to the project. There were students of the first to the third year of bachelor study programmes of the University of Polytechnics Jihlava (73 women and 31 men). These were mostly respondents from the Vysočina Region (75%). All students of the College of Polytechnics Jihlava, both full-time and part-time, had the opportunity to enrol in the project concerning the start-up business. In 2018, approximately 2,200 students studied at the university (College of Polytechnics Jihlava, 2018). Considering that the number of students at the time of the research was approximately 2,200, there is a certain limit to the research in this respect. The structure of the research sample by the field of study is shown in Table 1.

The division of the sample according to the economic and non-economic fields corresponds to the representation of the study programmes at the college. The economic study programme is one of the dominant ones and is represented by the following fields: Finance and Management; Travel and Tourism. There are 62 respondents from the economic study programme in the research sample (59.6%). Other study programmes are among the non-economic fields with a research sample of 42 respondents (40.4%). 73.1% of respondents are students interested in conducting business and 26.9% of respondents are students without a desire to conduct business. The first-year students involved 57 participants, the second-year students 24 participants and 23 students studied in the third year of bachelor's degree. Further, 53 students are enrolled in the full-time study programme and 41 students in part-time studies.

The analyzed data have the character of categorical and quantitative variables. The quantitative variables were data

Study programme	Absolute frequency	Relative frequency (%)
Finance and Management	30	28.8
Travel and Tourism	32	30.8
Applied Computer Science	11	10.6
Engineering for Industry	7	6.7
Computer Systems	5	4.8
General Nurse	4	3.9
Clinical Social Worker	15	14.4
Total	**104**	**100.0**

Table 1: Structure of Research Sample, 2018 (Source: Authors' Calculation)

obtained from points from a test that was part of the questionnaire. Data were examined for two basic areas:

a) according to students' attitudes to entrepreneurship (categorical data were obtained from this part on the basis of students' evaluation using a scale; scaling contained 4 to 5 variations in this section, the higher the value, the stronger the interest or preconception to conduct business);
b) according to the relation between students' interest in entrepreneurship and their knowledge (from this part, quantitative data were obtained as a score from the test that was part of the survey).

The questioning method and test method were used for the data collection. The questionnaire which included a knowledge test was composed of three parts consisting of several questions:

- Students' attitudes concerning entrepreneurship (A. Interest in conducting business; B. Preconception to conducting business; C. Respondent has a business idea and knows or does not know how to implement it).
- Knowledge about starting a business (legislative processes for setting up a business, duties to a tax office, social insurance for an entrepreneur, bookkeeping, or tax records); it was a test that contained 7 questions. The questions were selected according to their importance for business practice.
- Factual data of respondents (sex, region, study programme).

The wording of questions and the knowledge test score are included in Table 2.

Question	Score
1. Taking action to acquire a Trade Licence	2
2. Conditions for obtaining an unqualified notifiable trade	2
3. Registration to the tax office	1
4. Social insurance of an individual entrepreneur	1
5. Keeping records with an individual entrepreneur	3
6. Keeping records with a trading company	1
7. The amount of registered capital	1
Total score	**11**

Table 2: Questions in Knowledge Test and Scores, 2018 (Source: Authors' Calculation)

The questions used were closed with 4 offered options. There were more correct answers. The performance of the test was evaluated according to the number of correct answers. The number of points assigned to each question reflected the number of correct answers, i.e. 1 correct answer = 1 point, 2 correct answers = 2 points, etc. Thus, the questions were differentiated according to the difficulty, as more correct answers meant the need to think about the question and have a higher knowledge of the issues. Selected questions that were part of the test are listed lower.

If a natural person operates as an individual entrepreneur, there are the following options for management evidence for which they may opt:

a) Tax records of income and expenses – application of actual expenditure
b) Tax records of income and expenses – application of flat-rate expenditure (% of revenue)
c) Accounting (double-entry)
d) Simple accounting

In the case of unqualified trade, the entrepreneur must comply with the law:

a) Obtain an identity card.
b) Be of legal age.
c) Be impeccable.
d) Be professionally competent.

The questionnaire and test included in it had been subjected to a pilot test before main research started on a small sample of students (n = 8) who copied the features of the main research respondents. The questionnaire was then modified to increase its validity and reliability.

To verify the hypotheses, the data were processed and evaluated using the NCSS statistical software. Hypotheses 1 to 3 were tested using the Chi square test of independence at a 5% level of significance. This test demonstrates the dependency (or independency) between two variables. It can be used to determine the relation of two qualitative or sequence variables that have several categories, categorical variables. The null hypothesis H_0 states that the researched items are independent; an alternative Hypothesis H_1 expresses their dependence. Null hypotheses were formulated as follows:

- $H_{0\text{-}1}$: *The interest in doing business does not differ among students of economic and non-economic programmes.*
- $H_{0\text{-}2}$: *The perception of preconceptions as a barrier to starting a business does not differ among students of economic and non-economic programmes.*
- $H_{0\text{-}3}$: *In terms of subjective perception of one's own business idea and knowledge of implementation, students of economic and non-economic programmes are no different.*

Hypothesis 4 was tested using the Spearman correlation coefficient r_s. This test was used because the data follow a non-normal distribution and the order of values is dominant. The dependent variable is business knowledge (quantitative variable). The independent variables are the attitudes concerning entrepreneurship (ordinal variable). The null hypothesis $H_{0\text{-}4}$ was formulated as follows:

- $H_{0\text{-}4}$: $r_s = 0$
  There is no dependency between attitudes concerning entrepreneurship and knowledge.

Data were tested at a significance level of 5%. The dependence of variables may be ascending or descending. Spearman's correlation coefficient r_s takes values [− 1, 1].

RESULTS

Comparison of attitudes concerning entrepreneurship and knowledge among students of economic and non-economic programmes

The results of a comparison of attitudes concerning entrepreneurship and student knowledge are given in Table 3.

Variable	Max	Average		Median	
		Economist	Non-economist	Economist	Non-economist
Attitudes concerning entrepreneurship (the higher the value, the more interest / preconception / the more confidence in one's own business idea)					
A. Interest in doing business	4	3.07	3.05	3	3
B. Preconceptions concerning conducting business	4	2.84	2.82	3	3
C. Business idea and its transfer to reality	5	2.89	2.91	3	3
Test questions					
1. Taking action to acquire a Trade Licence	2	1.57	1.59	2	2
2. Conditions for obtaining an unqualified notifiable trade	2	1.44	1.43	2	2
3. Registration to the tax office	1	0.88	0.88	1	1
4. Social insurance of an individual entrepreneur	1	0.67	0.66	1	1
5. Keeping records with an individual entrepreneur	3	1.61	1.60	2	2
6. Keeping records with a trading company	1	0.77	0.75	1	1
7. The amount of registered capital	1	0.64	0.63	1	1
Total score	**11**	**8**	**7.55**	**7.58**	**8**

Table 3: Descriptive Statistics of Variables, 2018 (Source: Authors' Calculation)

Attitudes concerning entrepreneurship (factors A - C) among students of economic and non-economic study programmes at the College of Polytechnics Jihlava are balanced. The results show that students of both study programmes are more interested in doing business than their entrepreneurial preconceptions are (it is evidenced in average values for factors A, B). At the same time, their concerns about doing business are high (factor B). Preconceptions have been defined as business risk, self-insecurity, job security, lack of information on starting a business and managing it. The results are surprising as they show a high interest in entrepreneurship regardless of the study programme (balanced in both groups) and with a high level of concern of doing business (cf. Lima et al., 2015). Despite these preconceptions, students tend to be more into doing business. This result may also be related to students' motivation to practically oriented education, which was proven with students of the College of Polytechnics Jihlava in 2018 (Berková, Borůvková and Lízalová, 2018).

The analysis of students' knowledge of starting a business and legislative processes does not fully correspond to their attitudes. The total average score of all students (n = 104) from the knowledge test is 7.59 points, i.e. 69.1% success rate. In the view of the interest in doing business, students were the least successful in the question of keeping records with an individual entrepreneur. The success rate of economic study programmes was 54% and 53% in non-economic study programmes. Although students have shown interest in doing business, they are not fully aware of the real situation in the area of taxes and accounting and other legislative processes. Therefore, the researchers do not consider the test results to be positive. It will be necessary to strengthen students' knowledge and practical preparation for conducting business in the area of taxes and accounting. A comparison of the results between economic and non-economic study programmes points to the compliance (according to the median). According to average values, the results are better for students in non-economic programmes, but the difference is very small. Despite these consistent results, it should be noted that students of economic and non-economic programmes may be motivated in the education area differently. This means that they have different expectations, needs and requirements from tertiary studies. Applied Informatics students are more motivated compared to the students in the Finance and Management field. Their demands on education are higher. Their desire of knowledge is higher, they are more inquisitive. If they do not get deeper knowledge from teachers, they are demotivated. In contrast, students in the economic field are more indifferent to education. This means that they have lower ambitions for new deeper knowledge. Motivation can be a factor that affects students' knowledge even at the expense of further self-education (Berková, Borůvková and Lízalová, 2018).

The article does not deal more with the differences among students by the year of their studies because of the small size of the sample.

Differences in students' attitudes concerning entrepreneurship in terms of interest, preconditions and subjective evaluation of one's own idea and its implementation

Table 4 shows the results of testing the null hypotheses from $H_{0\text{-}1}$ to $H_{0\text{-}3}$, using the Chi square independence test. Data were analyzed at a significance level of 5%.

Null hypotesis	Critical value	Test statistics	*p*-value
H_{0-1}	7.815	4.527	0.209
H_{0-2}	7.815	2.032	0.566
H_{0-3}	9.488	3.122	0.538

Table 4: *p*-values Chi square test - difference between economic and non-economic study programme, 2018 (Source: Authors' Calculation)

The null hypotheses H_{0-1}, H_{0-2}, H_{0-3} can't be rejected on the level of significance 5%. This means that there are no significant differences between students of economic and non-economic study programmes in the field of entrepreneurship, business preconceptions. Also, there were no significant differences between groups in having their own business idea and knowledge of its implementation. Thus, it can be stated that for $n = 104$ students of economic and non-economic programmes, they behave in the same way. This can also be compared to the results of the average values of the factors under research (Table 3) in which the differences between groups are small. This result is not in harmony with researchers' expectations.

Table 5 shows the results of testing the null hypothesis H_{0-4} using the Spearman correlation coefficient (correlation matrix).

	Knowledge	Interest in business	Preconceptions	Own idea
Knowledge	1.000	0.125	-0.116	0.018
Interest in business	0.125	1.000	-0.374	0.458
Preconceptions	-0.116	-0.374	1.000	-0.296
Own idea	0.018	0.458	-0.296	1.000

Table 5: Spearman's Correlation Coefficient, 2018 (Source: Authors' Calculation)

At the 5% level of significance, there was no proven correlation between entrepreneurial interest and knowledge ($p = 0.205$), preconceptions concerning entrepreneurship and knowledge ($p = 0.239$) and having one's own business idea and knowledge ($p = 0.858$). At the same time, the values of Spearman's correlation coefficient, which do not exceed value 0.4, prove this fact too. At the 5% level of significance, the null hypothesis H_{0-4} isn't rejected.

Furthermore, the frequency of students' representation in individual variations of Part C - Business Idea and its Implementation was analysed. The data are shown in Table 6.

Variations	Economic programme		Non-economic programme	
	Absolute frequency	Relative frequency %	Absolute frequency	Relative frequency %
I have an idea and I don't know how to implement it.	7	11.29	9	21.43
I have an idea, but I'm afraid it's not good enough (so I'm not talking about it).	19	30.65	12	28.57
I have a business idea and I know exactly how to get started, what it takes.	5	8.06	4	9.52
I have no business idea and at the same time, I do not know how to get started and how it works.	12	19.35	9	21.43
I have no business idea, but I know how to start a business.	19	30.65	8	19.05

Table 6: Business Idea and its Implementation - Frequency 2018 (Source: Authors' Calculation)

For the students of economic and non-economic programmes, these similar behaviour traits can be found (in terms of the most frequent representation in the answers):

1. Have their own business idea but do not know how to start the business - they do not have the relevant knowledge (30.65% for economic programmes and 28.57% for non-economic programmes), or
2. They have no idea but have all the knowledge about starting a business (30.65% for economic programmes and 19.05% for non-economic programmes).

In the group of students of economic programmes, 50% of students have their own business idea. The researchers consider this result to be positive and therefore they see the potential for further development concerning entrepreneurship.

However, there is a bigger problem with the knowledge of entrepreneurship and starting business in the non-economic study programmes. 21.43% of students of non-economic programmes admit that they lack this knowledge. At the same time, the same representation of students has a business idea and does not know how to implement it. They are interested in doing business, but they are afraid of starting and conducting business because they lack information. Therefore, it will be desirable to strengthen students' motivation through new platforms and practical training methods. Training that will focus on entrepreneurship education, such as start-ups.

DISCUSSION

The research focused on students of professionally oriented College of Polytechnics Jihlava did not confirm the hypothesis that there are differences in the attitudes and knowledge of entrepreneurship among students of economic and non-economic study programmes. However, it has brought several interesting findings relevant to the future direction of the college education. It should be noted that the results are indicative as the sample of respondents includes only part of the students of the College of Polytechnics Jihlava. Considering that the number of students at the time of the research was approximately 2,000, there is a certain limit

to the research in this respect. 104 students were involved in the project, and all of them were also involved in the research that is why the sample can be considered credible, bringing relevant results. It would also be interesting to compare differences in interest in entrepreneurship and knowledge among students in different years of bachelor's studies. Students in different years of studies have different knowledge and practical skills with regard to their previous school or other experience. However, the results of this in-depth analysis did not produce significant results with an impact on the recommendations for education and economic practice. The lower sample of students is a limitation in this respect. Therefore, a comprehensive analysis for all years of bachelor's studies published in the article was conducted.

The results of the research are inconsistent with the empirical study (Lima et al., 2015). The authors of this study found a negative correlation of interest in entrepreneurship with higher education. These relations were not proven on a sample of students of the College of Polytechnics Jihlava. There are no differences in the interest in entrepreneurship, business preconceptions, and worries about this activity among students of different study programmes. Significant differences between student groups have not been proven even in the area of having their own business ideas and knowing how to start a business. However, this discrepancy may be due to the lower sample - the number of 104 students were involved in the entrepreneurship education project during 2018. Research is, therefore, the initial research as well as a stimulus for its expansion.

Worries about doing business are high among students of both programmes. Although they have the desire to do business and have their own business idea, they are afraid of starting their activities and they rather concentrate on studying at college. Parker (2004) explored the relationship between students' personal traits to entrepreneurship (willingness to risk, the need for success, the desire for autonomy, etc.) and the success of graduating from a college. He found negative relations among variables, which corresponds to the results of this research. Polytechnic College students have high preconceptions about doing business, at the same time they are interested in doing business, but their worries about starting a business are so big that they do not want to start it and thus they focus on their college studies. Cho (2017) recommends improving the quality of education through entrepreneurial education programmes for reconciling entrepreneurship with completing a university degree programme. Therefore, the possibility of doing their own business at the university, for example in the form of start-ups will be provided to students. Practical training is very motivating for students. Berková, Borůvková and Lízalová (2018) proved that in general context, the practicality and interactive form of teaching for students of non-economic programmes (technical fields) is more motivating than for students of economic programmes in the conditions of the College of Polytechnics Jihlava. Therefore, the creation of educational platforms for the development of entrepreneurship education, which is practical, will help students to focus on business, at the same time graduate from a college and, last but not least, develop the business potential of some Czech cities and regions. This can be gradually achieved already at college through experience-based learning (Lee et al., 2018). Although traditional methods are important and have a place in education, they are not dominant for entrepreneurship education. Von Graevenitz, Harhoff and Weber (2010) also positively perceive entrepreneurship education. They are of the opinion that both students and society can benefit from it. Such a combination of theory and practice in support of students' business plans has already been recommended by Fayolle, Gailly and Lassas-Clerc (2006). Entrepreneurship education has become a phenomenon that is important in both - in education as well as in practice (Anderson and Jack, 2008).

In particular, entrepreneurship education must provide students with general business knowledge, awareness of financial analysis, planning, pricing strategies, human resources management (Block and Stumpf, 1992). Knowledge may or may not be essential for starting a business. This research has not proven a correlation between students' attitudes concerning entrepreneurship and their knowledge of starting a business from a tax perspective and setting up a business. The results show that entrepreneurial potential can be seen in students of different study programmes. However, it is important to build an effective platform and content for entrepreneurship education (cf. Fayolle, Gailly and Lassas-Clerc, 2006).

CONCLUSION

The position and importance of entrepreneurship education are steadily increasing and becoming an important part of the implementation of higher education programmes in the national and international context. Research conducted at the end of 2018 among students of the College of Polytechnics Jihlava in the Czech Republic shows that students of various study programmes are eager to do business, have their own entrepreneurial ideas, but are afraid of starting their activities. There were 104 students who were involved in a project supporting starting their own business during the time studying at the college. It is a pilot project, its sustainability is guaranteed and its second year will be implemented in 2019. Students need leadership in the form of new platforms to ensure the development of entrepreneurship education at the college, regardless of the focus of study programmes. This is the right way to promote entrepreneurship in society by investing in young people's development.

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REFERENCES

Anderson, A.R. and Jack, S.L. (2008) 'Role typologies for enterprising education: the professional artisan?', *Journal of Small Business and Enterprise Development*, Vol. 15, No. 2, pp. 259-273. https://doi.org/10.1108/14626000810871664

Block, Z. and Stumpf, A. (1992) 'Entrepreneurship education research: experience and challenge'. In: Sexton, D., Kasarada, J. (eds.) *The State of the Art of Entrepreneurship*, pp. 17–42.

Berková, K., Borůvková, J. and Lízalová, L. (2018) 'Motivation of Students of Economic and Technical Fields as a Tool of Competitiveness of Universities and Colleges: Empirical Study', *Journal on Efficiency and Responsibility in Education and Science*, Vol. 11, No. 4, pp. 72-77. https://doi.org/10.7160/eriesj.2018.110401

Buenstorf, G., Nielsen, K. and Timmermans, B. (2017) 'Steve Jobs or No Jobs? Entrepreneurial activity and performance among Danish college dropouts and graduates', *Small Business Economics*, Vol. 48, No. 1, pp. 179-197. https:/dx.doi.org/10.1007/s11187-016-9774-1

Chen, L. (2013) 'IT entrepreneurial intention among college students: An empirical study', *Journal of Information Systems Education*, Vol. 24, No. 3, pp. 233-242. http://dx.doi.org/10.18000/ijisac.50150

Cho, Y.J. (2017) 'A study on the influence of University entrepreneurial education service quality of entrepreneurial intention: focused on the mediating effects of satisfaction with entrepreneurial education', *Asia-Pacific Journal of Business Venturing and Entrepreneurship*, Vol. 12, No. 2, pp. 95-103.

College of Polytechnics Jihlava (2018) *Výroční zpráva o* činnosti *Vysoké* školy *polytechnické Jihlava pro rok 2018* [Annual Report on VŠPJ Activities, 2018], [Online], Available: https://www.vspj.cz/skola/uredni-deska/vyrocni-zpravy-o-hospodareni [4 Oct 2019].

Cromie, S. (2000) 'Assessing entrepreneurial inclinations: Some approaches and empirical evidence', *European journal of work and organizational psychology*, Vol. 9, No. 1, pp. 7-30. https://doi.org/10.1080/135943200398030

Decker, W.H., Calo, T.J. and Weer, C.H. (2012) 'Affiliation motivation and interest in entrepreneurial careers', *Journal of Managerial Psychology*, Vol. 27, No. 3, pp. 302-320. https://doi.org/10.1108/02683941211205835

Fayolle, A., Gailly, B. and Lassas-Clerc, N. (2006) 'Assessing the impact of entrepreneurship education programmes: a new methodology', *Journal of European industrial training*, Vol. 30, No. 9, pp. 701-720. https://doi.org/10.1108/03090590610715022

Fiet, J.O. (2001) 'The pedagogical side of entrepreneurship theory', *Journal of business venturing*, Vol. 16, No. 2, pp. 101-117. https://dx.doi.org/10.1016/S0883-9026(99)00042-7

Gartner, W.B. (1988) 'Who is an entrepreneur? is the wrong question', *American journal of small business*, Vol. 12, No. 4, pp. 11-32. https://doi.org/10.1177/104225878801200401

Hatten, T.S. and Ruhland, S. K. (1995) 'Student attitude toward entrepreneurship as affected by participation in an SBI program', *Journal of Education for Business*, Vol. 70, No. 4, pp. 224-227. https://doi.org/10.1080/08832323.1995.10117754

Ireland, R.D., Hitt, M.A., Camp, S.M. and Sexton, D.L. (2001) 'Integrating entrepreneurship and strategic management actions to create firm wealth', *Academy of Management Perspectives*, Vol. 15, No. 1, pp. 49-63. https://doi.org/10.5465/ame.2001.4251393

Kreiser, P.M., Marino, L.D. and Weaver, K.M. (2002) 'Assessing the psychometric properties of the entrepreneurial orientation scale: A multi-country analysis', *Entrepreneurship theory and practice*, Vol. 26, No. 4, pp. 71-93. https://doi.org/10.1177/104225870202600405

Lee, S.T., Lee, H.K., Ki, H.S. and Gim, G.Y. (2018) 'An Influence on Online Entrepreneurship Education Platform Utilization and Self-deterministic to College Students' Entrepreneurial Intention', *International Conference on Computer and Information Science*. Springer, Cham, pp. 189-211. https://doi.org/10.1007/978-3-319-98693-7_13

Lima, E., Lopes, R. M., Nassif, V. and da Silva, D. (2015) 'Opportunities to improve entrepreneurship education: Contributions considering Brazilian challenges', *Journal of Small Business Management*, Vol. 53, No. 4, pp. 1033-1051. https://doi.org/10.1111/jsbm.12110

McCrae, R.R. and John, O.P. (1992) 'An introduction to the five-factor model and its applications', *Journal of personality*, Vol. 60, No. 2, pp. 175-215. http://dx.doi.org/10.1111/j.1467-6494.1992.tb00970.x

Miner, J.B. (2000) 'Testing a psychological typology of entrepreneurship using business founders', *Journal of Applied Behavioral Science*, Vol. 36 No. 1, pp. 43-69. https://doi.org/10.1177/0021886300361003

Ministry of Industry and Trade (2017) *Zpráva o vývoji malého a středního podnikání a jeho podpoře v roce 2017* [Report on Small and Medium Enterprises Development and Support in 2017], [Online], Available: https://www.mpo.cz/assets/cz/podnikani/male-a-stredni-podnikani/studie-a-strategicke-dokumenty/2018/10/Zprava_MSP_2017.pdf [4 Oct 2019].

Murugesan, R. and Dominic, P.D.D. (2012) 'A study on association between personality constructs and entrepreneurial attitudes', *International Journal of Business Excellence*, Vol. 5, No. 4, pp. 378-394. https://dx.doi.org/10.1504/IJBEX.2012.047905

Neck, C.P., Neck, H.M., Manz, C.C. and Godwin, J. (1999) 'I think I can; I think I can': a self-leadership perspective toward enhancing entrepreneur thought patterns, self-efficacy, and performance', *Journal of Managerial Psychology*, Vol. 14, No. 6, pp. 477-501. https://doi.org/10.1108/02683949910287912

Parker, S.C. (2004) *The economics of self-employment and entrepreneurship*. Cambridge: University Press.

Rauch, A. and Frese, M. (2000) 'Psychological approaches to entrepreneurial success: a general model and an overview of findings', in Cooper, C.L. and Robertson, I.T. (Eds.), *International Review of Industrial and Organizational Psychology*, pp. 101-141. Chichester: Wiley.

Rauch, A. and Frese, M. (2007) 'Let's put the person back into entrepreneurship research: A meta-analysis on the relationship between business owners' personality traits, business creation, and success', *European Journal of work and organizational psychology*, Vol. 16, No. 4, pp. 353-385. https://doi.org/10.1080/13594320701595438

Ronstadt, R. (1985) 'The educated entrepreneurs: A new era of entrepreneurial education is beginning', *American journal of small business*, Vol. 10, No. 1, pp. 7-23. https://doi.org/10.1177/104225878501000102

Schumpeter, J.A. (1934) *The theory of economic development*. New York: Harvard.

Simpeh, K.N. (2011) 'Entrepreneurship theories and Empirical research: a summary review of the literature', *European Journal of Business and Management*, Vol. 3, No. 6, pp. 1-8.

Stewart, W.H. and Roth, P.L. (2007) 'A meta-analysis of achievement motivation differences between entrepreneurs and managers', *Journal of Small Business Management*, Vol. 45, No. 4, pp. 401-421. https://doi.org/10.1111/j.1540-627X.2007.00220.x

UNCTAD Secretariat (2011) 'Entrepreneurship Education, Innovation and Capacity-Building in Developing Countries', *United Nations Conference on Trade and Development (UNCTAD)*, Geneva, pp. 1-21.

van Eeden, S., Louw, L. and Venter, D. (2005) 'Entrepreneural traits of undergraduate Commerce students: a three-country comparison', *Management Dynamics: Journal of the Southern African Institute for Management Scientists*, Vol. 14, No. 3, pp. 26-43.

von Graevenitz, G., D. Harhoff, and Weber, R. (2010) 'The Effects of Entrepreneurship Education', *Journal of Economic Behavior and Organization*, Vol. 76, No. 1, pp. 90–112. https://doi.org/10.1016/j.jebo.2010.02.015

Zhang, S. (2014) 'Successful Internet Entrepreneurs Don't Have To Be College Dropouts: A Model for Nurturing College Students to Become Successful Internet Entrepreneurs', *International Journal of Information and Communication Technology Education (IJICTE)*, Vol. 10, No. 4, pp. 53-69. https://dx.doi.org/10.4018/ijicte.2014100105

Full research paper

INVESTIGATING THE VARIETY AND USUALNESS OF CORRECT SOLUTION PROCEDURES OF MATHEMATICAL WORD PROBLEMS

Libuše Samková

Department of Mathematics, Faculty of Education, University of South Bohemia, České Budějovice, Czech Republic

✉ lsamkova@pf.jcu.cz

ABSTRACT

The contribution focuses on issues related to the implementation of formative assessment methods into inquiry based teaching, by means of issues related to solving twelve multiple-step arithmetic word problems based on operations with natural and rational numbers. These word problems have multiple correct solution procedures and the presented qualitative exploratory empirical study investigates how varied and how usual might be correct solution procedures provided by diverse groups of solvers – future primary school teachers attending diverse university mathematics courses of diverse forms and/or time extent. According to written data collected from 149 solvers, six notions are introduced in the paper: majority, minority and even solution procedures, and majority, minority and mixed solvers. Issues regarding minority solvers are recognized as an important element for implementing formative assessment methods. All the six notions are illustrated in the paper by samples of solution procedures and diagrams of relative frequency. Implications are given for formative assessment within any kind of education involving multiple-step word problems, regardless of the extent of implemented inquiry.

KEYWORDS

Formative assessment, inquiry based mathematics education, open approach to mathematics, primary school teachers, solving strategies, word problems

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Highlights

- *Open approach to mathematics is closely connected to formative assessment.*
- *Open word problems and records of their solution procedures offer an effective insight into classroom events related to formative assessment.*
- *Six notions established in the paper: majority, minority and even solution procedures, and majority, minority and mixed solvers.*
- *Illustrations given to the variety and usualness of correct solution procedures provided by diverse groups of future primary school teachers.*

INTRODUCTION

One of the educational concerns that has attracted quite a lot of attention across countries in recent decades relates to looking for sustainable ways of implementing inquiry based education into everyday teaching and learning of various school subjects at various school levels. Alongside efforts to specify potential advantages and disadvantages of the inquiry based approach (McComas, 2002; Minner, Levy and Century, 2010; Bruder and Prescott, 2013), to conceptualize this approach within the context of other educational frameworks and in international contexts (Artigue and Blomhøj, 2013; Schoenfeld and Kilpatrick, 2013), to analyse the effects of this approach on knowledge and attitudes of pupils (Hattie, 2008; Jiang and McComas, 2015; Savelsbergh et al., 2016) and to provide teachers with enough training and didactical materials such as assignments and didactical analyses of inquiry tasks (Ulm, 2011; Baptist and Raab, 2012; Maaß and Reitz-Koncebovski, 2013), lately there also emerged efforts to analyse and conceptualize various ways of classroom assessment that would be suitable for the inquiry based approach. As summarized by Dolin and Evans (2018), one of the possible solutions to that call might be hidden in formative assessment methods (Black and Wiliams, 2009; Shavelson et el., 2008), e.g. in on-the-fly assessment and peer-assessment. Another solution to that call might be obtained by investigating the

inquiry based environment through problems and tasks that are assigned to pupils during inquiry based lessons. Such tasks are usually open in the sense of an open approach to mathematics (Pehkonen, 1997; Nohda, 2000), an approach that has a lot in common with inquiry based education (Samková, 2017) as well as with formative assessment methods (Hino, 2007). One of the subcategories of open tasks consists of tasks with multiple correct solution procedures, which are the tasks that are employed in this particular contribution.

Issues reported here are a part of a larger educational research project named *Learning hyperspace for formative assessment and inquiry based teaching in science and mathematics* that is supported by the Technology Agency of the Czech Republic. The aim of the project is to create a learning hyperspace (online interactive environment) for teachers where they could learn how to implement formative assessment into their inquiry based teaching. This paper belongs to the preparatory stage of the project, where we intend to map the classroom environment related to inquiry based education from the perspective of formative assessment. In particular, the presented study focuses on mathematical inquiry provided by word problems with multiple correct solution procedures and on issues related to the assessment of such problems. In a broader context, the paper aims to contribute to the ongoing establishment of the principles of on-the-fly assessment and peer-assessment within inquiry based teaching and learning, while touching matters that go far beyond this environment – matters that are relevant also for teachers that do not intend to implement formative assessment and/or inquiry based methods to their teaching knowingly or in a systematic way. Since word problems are regularly employed in mathematics education at all school levels, the paper addresses matters which concern every teacher who has ever employed in their teaching a word problem that happened to have multiple correct solution procedures.

The reported qualitative exploratory empirical study investigates 12 word problems with multiple correct solution procedures and then focuses on particular correct solution procedures provided by individual solvers as well as on the usualness of these procedures among the group of solvers that attend together the same mathematics lessons. The mathematical content of the word problems consists of operations with natural numbers and operations with rational numbers (namely fractions). The participants of the study (i.e. the solvers of the word problems) were 149 attendants of various university programs conducted in various school years. Within the programs, all of the attendants were trained to become teachers at the primary school level.

The themes that meet behind the reported study have already been discussed at ERIE conferences and in the ERIES Journal: formative assessment (Hošpesová and Žlábková, 2016; Jahodová Berková, 2017), inquiry based education and open approach to mathematics (Samková and Tichá, 2016; Medová, Bulková and Čeretková, 2018), correct and incorrect strategies for solving word problems (Novotná and Vondrová, 2017; Samková, 2018a).

This paper has been developed as an extension of the contribution (Samková, 2019). Data analysis from that contribution was enriched by additional data from three other groups of participants that all attended university mathematics courses on the same mathematical content as the original group of participants but their courses differed in the form of teaching and/or time extent. Such an enrichment offered a wider variety of outcomes and the method of constant comparison then led to more precise specifications of notions related to usualness of correct solution procedures that had been newly established in (Samková, 2019) as well as to the establishment of another new notion. The issues discussed in (Samková, 2019) form a part of the first stage of the study presented in this paper.

The text is organized as follows: at the beginning, it presents the context of the study (inquiry based mathematics education, word problems with multiple solution procedures and formative assessment), the four groups of participants and the diagnostic instrument. Then it describes consecutively the four stages of the study (the course of data collection and data analysis, findings, emerging concerns), discusses their findings and captures further implications for our research project.

Inquiry based mathematics education and open approach to mathematics

The term of inquiry based education refers to a student-centered type of education in which students are invited to work similarly as scientists work: observe, pose questions, reason, search for information, collaborate, collect data and interpret them, discuss obtained results (Dorier and Maass, 2014). In mathematics, an appropriate inquiry based learning environment can be successfully achieved through tasks with multiple correct ways of interpreting the task assignment, multiple correct ways of solving, multiple correct results and/or multiple correct ways of interpreting the results. Such tasks are called open in the sense of open approach to mathematics (Pehkonen, 1997; Nohda, 2000).

For assessment of open mathematical problems, Nohda (2000) suggests to refer to *fluency* (how many solutions the student produced), *flexibility* (how many mathematical ideas the student employed or discovered), *originality* (to what extent are the ideas original) and *elegance* (to what extent are the explanations simple and clear). Bulková and Čeretková (2017) put their emphasis during assessment more on the practical and analytical aspects and suggest to refer to *originality*, *correctness of conclusion* (which includes exactness, clarity and coherence of information used, relevance of sources and closeness of the conclusions to the goal of the task) and *applicability of conclusion and solving process value for following studies* (to what extent the conclusion and/or solving process could be easily generalized within same, similar or distinctive contexts). In this study, I propose another aspect to take into consideration. This aspect is *usualness* (how usual among the group of solvers is the particular way of solving that the student provided). It relates to originality and remotely also to fluency and applicability, and these relations are illustrated in the paper.

Formative assessment

The type of assessment that is in the focus of this contribution is the formative one, which is, in simple terms, assessment for learning, i.e. assessment that helps students to learn. According to Black and Wiliam (2009: 8), 'formative assessment

can be conceptualized as consisting of five key strategies: 1. Clarifying and sharing learning intentions and criteria for success; 2. Engineering effective classroom discussions and other learning tasks that elicit evidence of student understanding; 3. Providing feedback that moves learners forward; 4. Activating students as instructional resources for one another; and 5. Activating students as the owners of their own learning.' In the classroom, the formative assessment may appear in various forms referring to various key strategies or their combinations. In this contribution, I address the forms called on-the-fly assessment and peer-assessment. The on-the-fly form refers to interactions among the teacher and the students that have not been planned by the teacher in advance. These interactions take place in the classroom when the teacher recognizes an opportunity to support students in their further learning and acts on it by questioning or commenting (Shavelson et al., 2008). The peer-assessment form refers to interactions among the students themselves, where the students discuss without the help of the teacher and provide feedback to each other (Topping, 2013).

Both the above mentioned forms of formative assessment require quality feedback, which can come in the classroom in four different levels related to four different focuses (Hattie and Timperley, 2007). In relation to matters that occur in the classroom during task solving, this contribution mainly addresses two of the levels: the one that focuses on the task that the students are solving, and the one that focuses on the processes used by students to complete the task. In case of peer-assessment, the quality of the feedback is strongly connected to the extent of students' understanding of the assessed topic (Le Hebel et al., 2018); in case of on-the-fly assessment, the quality depends on teacher's ability to notice specific solutions, problems or innovative approaches and on their willingness to initiate conversations (Harrison et al., 2018).

In the Czech Republic, where the referred study is situated, the notion of formative assessment is generally known in the educational community but many of future teachers and teachers have never experienced formative assessment as learners, nor have they been trained to implement it in their own teaching (Rokos and Závodská, 2015).

MATERIALS AND METHODS

My study aims to answer three research questions:

Q1: „How varied are correct procedures that future primary school teachers use for solving open mathematical word problems?"

Q2: „How usual among the solvers are particular correct procedures for solving particular word problems?"

Q3: „How usual among the solvers are the procedures used by particular solvers?"

The design of the study is an exploratory qualitative one since the phenomena of variety or usualness have not been studied before. To explore and describe the nature of the variety and the nature of the usualness, collected data would go through qualitative analysis, using open coding and constant comparison (Miles, Huberman and Saldaña, 2014). Afterwards, additional information on the issue would be obtained through basic statistic methods and illustrated by diagrams of relative frequency.

PARTICIPANTS

The research was conducted with four consecutive groups of participants that differed in the form and extent of a mathematics course that the participants attended just before data collection. The participants were students of two diverse study programs at the Faculty of Education, University of South Bohemia in České Budějovice. Within both the study programs, the participants were trained to teach all school subjects at primary school level (pupils from 6 to 11 years of age).

The first group participants were 24 students of the second year of a five-year full time master degree program for future primary school teachers. This program is mostly frequented by students that came to university directly from the secondary school, with no experience in teaching. During the whole school year, these participants were attending a course on mathematics conducted in an inquiry based manner, which focused on content issues related to natural and rational numbers. The course was held regularly in the time extent of 3 hours a week, i.e. 81 hours altogether. At the seminars of the course, the participants often solved word problems that were open. At first, the word problems had a unique way of grasping and a unique correct answer but multiple correct ways of solving. For each of the tasks, the teacher asked the solvers to look for various correct ways of solving and record them *all* on a blackboard. Later on, they also faced word problems with multiple ways of interpreting the assignment or/and multiple correct answers. The participants solved the tasks individually, and then they altogether presented, discussed and defended their various solution procedures and answers, looked for relations among them. In such a setting, they had a lot of opportunities to observe and discuss various ways of solving open tasks.

The second group participants were 49 students attending the same study program and the same mathematics course in one of the subsequent academic years. This subsequent course was not conducted in an inquiry-based manner but focused on the same mathematics content in the same extent as the previous one. During the seminars of the course, the second group participants solved the same word problems as the first group participants. Each of the tasks was solved on the blackboard by one of the attendants but no other solution procedures were presented or widely discussed.

The third group participants were 37 students attending the same study program and the same mathematics course in a different subsequent academic year. The design of the course was the same as with the second group participants.

The fourth group of participants consisted of 39 students attending the first year of a two-year distance retraining program for kindergarten and secondary school teachers of various teaching experience and various specialisations, designed to qualify them for teaching at the primary school level. These fourth group participants attended only a ten-hour condensed mathematics course in the form of a lecture (i.e. without seminars) that covered the same mathematics

content as the whole-year courses attended by the first, second and third group participants. The lecturer informed the attendants briefly about various didactical models for solving word problems but the attendants themselves did not solve any tasks on the blackboard.

Data collection and data analysis were carried out in four separate consecutive stages, each stage with one group of participants. Data from the second, third and fourth stages served as additional to data from the first stage.

Diagnostic instrument

As a diagnostic instrument in my study, I used twelve multiple-step arithmetic word problems related to mathematical content at the primary school level. All of them are listed in Table 1.

W1	Wes plays the violin. The last week before the competition, he has been training 4 hours a day. How many minutes is it?
W2	How many different ways can 44 children be divided into three and five-member teams provided the number of three-member teams is less than 10?
W3	A 21-meter straight fence consists of 13 posts on which the mesh is taut. The posts are equally spaced apart. What is the distance between adjacent posts?
W4	A lorry should transport 67 tons of sand. After 6 rides of a fully loaded car, 19 tons remain to be transported. How many rides does the lorry still have to make?
W5	Tom and Karel have 68 marbles altogether. Karel has 14 marbles more than Tom. How many marbles has Tom?
W6	Edith and Jane bought a book together. Jane contributed 120 crowns to the book, Edith 74 crowns. How many crowns does Edith have to pay to Jane to participate equally?
W7	One big dumpling can be cut into 12 slices. How many big dumplings does the family need for lunch if the father eats 2/3 of the big dumpling, the mother 1/4, the daughter eats 4 slices and the son 6 slices? How many slices are left?
W8	There are 16 girls in our class, which is 4/7 of all pupils. How many boys are there?
W9	A greengrocer came to a market for two days. On Monday he sold 3/8 of his potatoes, on Tuesday 4/5 of the rest. How much of the potatoes was not sold? How many kilograms of potatoes did the greengrocer bring to the market provided he sold 200 kilograms on Tuesday?
W10	Yesterday, a bakery driver delivered baked rolls three times. During the first drive, he delivered 2/5 of the rolls, then 2/5 of the rest. 900 of the rolls remained for the last drive. How many rolls did the driver deliver during the first drive?
W11	With a big pump, the water reservoir would have been filled in 7 days, with a small pump in 9 days. The big pump is broken and needs to be repaired, so only the small one can be used for the first three days of the filling process. Both pumps will be used from day four. When the reservoir will be filled?
W12	A breeder keeps rabbits. Currently, 1/3 of his rabbits are white, and the others are grey. The breeder plans to give 3 grey rabbits to his neighbour today and get 3 white ones for exchange. After this exchange, the proportion of white rabbits will rise to 4/9. How many rabbits does the breeder have?

Table 1: The word problems on natural numbers (W1 to W6) and on rational numbers (W7 to W12); own translation

Six of the word problems focused on natural numbers and operations with them, the other six on rational numbers and operations with them. The word problems were based on various didactical concepts: on time unit conversions, diophantine partitions, equidistant partition, equal partition with a remainder, unequal partition and equal sharing in the case of natural numbers, and on various combinations of part-whole interpretations of fractions (one/more wholes, wholes that are complements to fractional parts of other wholes, fractional changes) in the case of rational numbers.

THE FIRST STAGE

Data collection and data analysis

During the first stage, I collected written records of solution procedures that the first group participants submitted as parts of two standard written tests. For all of these participants, the two tests served as parts of the course assessment, i.e. they were compulsory and came after the related topics had been discussed at lectures and properly practised at course seminars. For the purpose of each of the tests, the participants were divided into two almost equally sized subgroups and each of the subgroups got different assignments of the test. One of the assignments on natural numbers comprised of word problems W1, W3 and W6, and the other one of W2, W4 and W5. One of the assignments on rational numbers comprised of word problems W7, W10 and W12, and the other one of W8, W9 and W11. In such an arrangement, each of the first group participants got to solve six of the word problems included in this study (three on natural numbers and three on fractions), and each of the twelve word problems included in this study was assigned to approximately half of the first group participants as well.

Since all of the word problems fit into the primary school curriculum and the participants were trained in the course to become primary school teachers, they were not allowed to employ tools beyond primary school curriculum in their solution procedures, i.e. they were not allowed to use

unknowns or equations. For the same reason, the solvers were allowed to use only natural numbers in their solution procedures to the natural number tasks W1 to W6. In particular, they had to employ centimetres to solve the task W3 correctly.

During data analysis related to the first research question, I registered various correct solution procedures that appeared in data related to particular word problems and the nature of their differences. I considered as same the procedures that consisted of the same constituent steps (calculations, employed concepts) provided in the same order.

During data analysis related to the second research question, I ascertained the usualness of each correct solution procedure based on the relative frequency of the solution procedure among the group of all participants.

During data analysis related to the third research question, I observed whether there was any tendency in the usualness for individual participants across all word problems.

RESULTS OF THE FIRST STAGE

From the perspective of individual word problems – variety

The initial analysis of data from the first stage of data collection revealed four word problems that were solved successfully by all of the first group participants (W1, W2, W6 and W9) and eight word problems with one or more unsuccessful participants who did not provide a solution to the problem or provided an incorrect one. The least successful were the participants at the tasks W11 where 5 of 11 failed and W12 where 8 of 13 failed.

The subsequent analysis focused in more detail on the correct solution procedures that were provided by the successful solvers. It revealed 2 to 5 different correct solution procedures provided by the participants to *each* of the word problems. The word problems with the highest number of different correct solution procedures were W9, W11 and W12, while the problems with the lowest number of different correct solution procedures were W1 and W5. Samples of correct solution procedures are presented in Table 2.

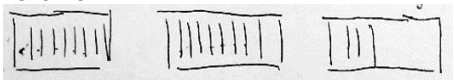
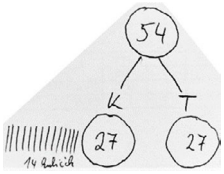
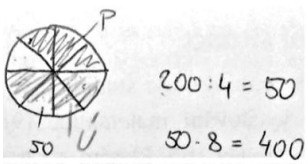
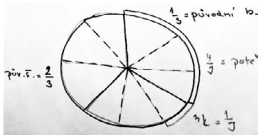
W1	4 h = 240 min 240 · 7 = **1680**	7 · 4 = 28... hours 28 · 60 = **1680**... minutes	
W4	67 – 19 = 48 48: 6 = 8 19: 8 = 2 + remainder 3 two rides full, another one with just 3 tons → **3** rides	67 – 19 = 48 48: 6 = 8 8 · 2 = 16 8 · 3 = 24 16 < 19 < 24 **3** rides	67 – 19 = 48 48: 6 = 8  **3** rides
W5	68 – 14 = 54 54: 2 = **27**		68: 2 = 34 14: 2 = 7 34 – 7 = **27**
W6	120 + 74 = 194 194: 2 = 97 97 – 74 = **23**	120 + 74 = 194 194: 2 = 97 120 – 97 = **23**	120 – 74 = 46 46: 2 = **23**
W7	2/3 of 12 = 8 1/4 of 12 = 3 8 + 3 + 4 + 6 = 21 12 · 2 = 24 **2** dumplings 24 – 21 = **3** slices	2/3 of 12 = 8 1/4 of 12 = 3 8 + 3 + 4 + 6 = 21 21: 12 = 1 9/12 **2** dumplings 12 – 9 = **3** slices left	father + daughter = 1 whole dumpling mother + son = 3 + 6 = 9 slices from the **second** dumpling → **3** slices left
W9	4/5 of 5/8 is 200 kg 5/5 is 250 kg... the rest from Monday 5/8 = 250 kg 8/8 = **400 kg** altogether not sold... **50 kg**	8/8 – 3/8 = 5/8 5/8 ·1/5 = **1/8**... not sold 200: 4 = 50 50 · 5 = 250 250 = 5/8 of the potatoes 250: 5 = 50 50 · 8 = **400 kg** brought	
W12	1/3 + 3... 4/9 1/3 = 3/9 3... 1/9 4/9... 12 5/9... 15 12 + 15 = **27**	white 1/3 = 3/9 4/9 – 3/9 = 1/9 grey 2/3 = 6/9 6/9 – 5/9 = 1/9 1/9 = 3 rabbits altogether... 3 · 9 = **27**	 1/9 = 3 rabbits 9/9 = 3 · 9 = **27**

Table 2: Various correct solution procedures to the tasks W1, W4, W5, W6, W7, W9 and W12 from the first stage; translation of texts in embedded pictures: kuličky = marbles, P = Monday (abbr.), Ú = Tuesday (abbr.), pův. š. = grey before (abbr.), původní b. = white before (abbr.), poté b. = white after (abbr.), k = rabbit (abbr.)

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Detailed analysis of the provided procedures drew my attention to frequently occurring misplacement of active and passive factors in multiplications. Some of the occurrences also appeared in Table 2: the second solution procedure belonging to the task W4 says 8 · 2 and 8 · 3 instead of 2 · 8 and 3 · 8, the second solution procedure belonging to the task W9 says 50 · 5 instead of 5 · 50 and 50 · 8 instead of 8 · 50, the second and third solution procedures belonging to the task W12 say 3 · 9 instead of 9 · 3. Since the participants had not yet attended courses on didactic of mathematics, I did not consider these procedures as incorrect. For the purpose of data analysis, namely for the purpose of decision on sameness of solution procedures provided by various solvers, I considered the solution procedures with misplacements as having the order of factors in multiplications swapped to the proper one.

The solution procedures that were not same differed in various aspects: used different models for the situation described in the word problem, used the same model but employed different relations found in it, choose a different order of relations found in the same model, grasped the assignment of the word problem differently. Some samples from those shown in Table 2 are commented below.

For the task W1, all the solvers used the same model but employed two different orders of solution steps depending on two different placements of unit conversions within the solution procedure: at the beginning, or at the end.

For the task W4, the solvers based their solutions on three different calculation models: division with a remainder, comparison to multiples and one-to-one distribution provided by an illustrative picture.

For the task W5, the solvers used two different models of unequal partition to represent the situation of the task: the sum-of-parts model and the division-into-parts model (MacGregor and Stacey, 1998). One of the solvers with the sum-of-parts model also accompanied her solution by an illustrative picture.

For the task W6, there appeared three different solution procedures, the first and second ones were based on the same model but used different relations from the model in the last step of the procedure (Edith's perspective vs Jane's perspective). The third solution procedure used symmetry and offered an original perspective on the situation.

For the task W9, there appeared two different ways of grasping the first question in the assignment. In the Czech language, the original wording of the question has two common meanings: „How many of the potatoes..." as well as „How much of the potatoes...". Majority of the solvers addressed the first meaning but some of them addressed the second one (e.g. in the second sample related to W9 in Table 2).

For the task W12, there were only five successful solvers and each of them provided different solution procedure.

Some of the correct solution procedures were accompanied by or based on pictures (schemes, pie diagrams, segment diagrams, etc.), samples of these pictures are presented in Table 2. However, the majority of the solvers did not use any illustrations.

From the perspective of individual word problems – usualness

Further analysis of first stage data revealed two diverse types among the twelve observed word problems: five of the word problems were with several most frequent correct solution procedures evenly used by the successful solvers (W5, W9, W10, W11 and W12), and seven of the word problems were with the most frequent correct solution procedure used by majority of the successful solvers (W1, W2, W3, W4, W6, W7 and W8). For the tasks W1, W4, W6 and W7, the most frequent correct solution procedures are the first ones given in Table 2. For detailed diagrams of the relative frequency of individual solution procedures among the first stage participants see Figure 1. The diagrams have been composed as follows: the sectors related to incorrect solution procedures are shaded, the sectors related to correct solution procedures are unshaded, the labels that are written in italics belong to word problems with different correct solution procedures evenly used by the solvers, the labels in bold roman belong to word problems with majority and minority correct solution procedures.

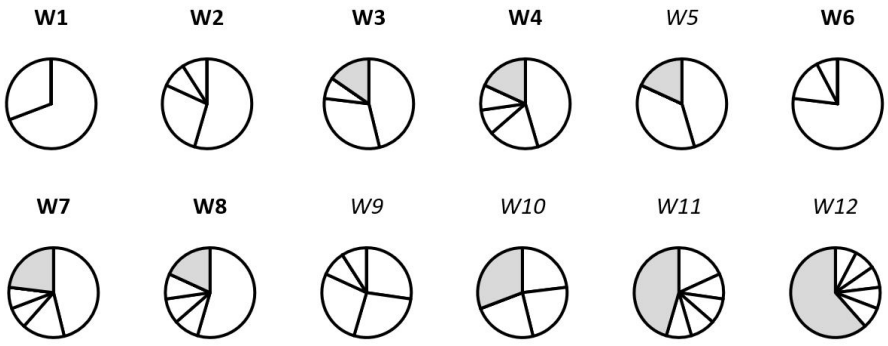


Figure 1: The diagrams of the relative frequency of individual solution procedures among the first group of participants that got to solve particular word problems, *n*=13 (for W1, W3, W6, W7, W10, W12), *n*=11 (for W2, W4, W5, W8, W9, W11), 2014-2015 (source: own calculation)

The task W5 met both the above characteristics since it got solved by 11 participants, 2 of them provided incorrect solution procedures, 5 of them provided the first correct solution procedure and 4 of them provided the second correct solution procedure. Here the 5 solvers with the first solution procedure form the majority of successful solvers. But with odd number of successful solvers (5 + 4 = 9) and only two different correct solution procedures, the two alternatives with

numbers of corresponding solvers differing only by 1 can also be considered as evenly distributed. Moreover, there is no possibility to avoid majority with odd number divided into two integer parts. Similar situation appeared also with the task W11, where the most frequent correct solution procedure was provided by 2 solvers, and the others four by 1 solver each. In order to deal in general with this ambiguity, I decided to categorize the word problems with two most frequent correct solution procedures with numbers of solvers differing only by 1 as word problems with correct solution procedures evenly used by solvers.

The correct solution procedures used evenly by the solvers will be called *even solution procedures*, the correct solution procedures used by the majority of successful solvers will be called *majority solution procedures* and the correct solution procedures used by the minority of successful solvers will be called *minority solution procedures*.

From the perspective of individual solvers

From the perspective of individual solvers, I analysed in more details data related to the seven word problems with majority and minority solution procedures. Data analysis revealed four diverse groups of participants: those who used the majority solution procedures in all relevant cases (3 participants), those who used the majority solution procedures in all but one (10 participants), those who used the minority solution procedures in all relevant cases (7 participants) and those who used the minority solution procedures in all but one (4 participants). The participants from the first two groups might be together characterized as tending to use the majority solution procedures, the participants from the other two groups as tending to use the minority solution procedures. With such specifications of the term *tending*, we may state that 3 + 10 = 13 of the participants tended to use the majority solution procedures (we may call them *majority solvers*) and 7 + 4 = 11 tended to use the minority solution procedures (*minority solvers*).

Emerging concerns

After the first round of data analysis, the above mentioned findings naturally emerged a concern on how the dataset would be enriched when addressing the three research questions with a different group of participants – for instance with participants attending the same study program and the same mathematics course but not in the inquiry based manner. To address more directly the particular issues from the first stage related to tasks with majority and minority procedures, I decided to focus in detail on the test on natural numbers where all tasks but one were of this type. This choice led to the second stage of the study. To address more directly the particular issues from the first stage related to tasks with even procedures, I decided to focus in detail on the test on rational numbers where all but two tasks were of this type. This choice led to the third stage of the study.

THE SECOND STAGE

Data collection and data analysis

During the second stage, I collected written records of solution procedures that the second group participants submitted as a part of a standard written test on natural numbers. As in the first stage, the test served as a part of the course assessment and came after the topic of natural numbers had been discussed at lectures and properly practised at course seminars. Again, the participants were divided into two almost equally sized subgroups and each of the subgroups got a different assignment of the test. The assignments were taken from the first stage: one of them comprised of word problems W1, W3 and W6, and the other one of W2, W4 and W5. The method of data analysis was the same as in the first stage.

RESULTS OF THE SECOND STAGE

From the perspective of individual word problems – variety

In the second stage, each of the word problems had several unsuccessful participants who did not provide a solution to the problem or provided an incorrect one. The least successful were the participants at the tasks W4 and W5 where 7 of 24 failed and at the task W3 where 7 of 25 failed. The participants provided 2 different correct solution procedures to the word problems W2, W3, W5 and W6, and 3 different correct solution procedures to the word problems W1 and W4. Only two of the correct solution procedures from the second stage had not appeared during the first stage, both of them with different authors but similarly employing an additive model for solving a multiplicative situation for the tasks W1, W4 (for a sample see Table 3).

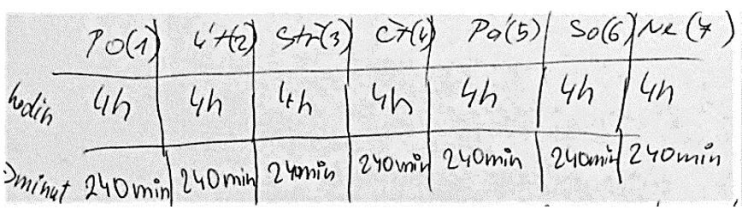
W1	4 h = 60 + 60 + 60 + 60 = 240 min 7 days = 240 + 240 + 240 + 240 + 240 + 240 + 240 = **1680** min 

Table 3: One of the newly emerged correct solution procedures from the second stage; translations of texts in the embedded picture: Po = Monday (abbr.), Út = Tuesday (abbr.), St = Wednesday (abbr.), etc.

The number of provided correct solution procedures was smaller in the second stage than in the first stage, although the number of participants was twice as large.

From the perspective of individual word problems – usualness

Similar as in the first stage, the correct solution procedures from the second stage were either even, majority, or minority ones. Considering the characteristic of the task as an information about the type of procedures used by its solvers (even, majority/minority) and about the order of the procedures by their relative frequencies, collected data showed that only the characteristics of the tasks W4 and W6 stayed the same in the second stage as in the first stage. For the tasks W1, W2 and W3, the majority solution procedures from the first stage were not the same as the majority solution procedures from the second stage. For the task W5, the frequency of the first correct solution procedure increased in the second stage in such a way that it changed from even to majority. That means that all of the six tasks had majority and minority procedures in the second stage. See Figure 2 for detailed diagrams of the relative frequency of individual solution procedures among the second stage participants. The sectors related to incorrect solution procedures are shaded and the sectors related to correct solution procedures are unshaded. The order of particular solution procedures around the diagrams in Figure 2 is the same as in Figure 1.

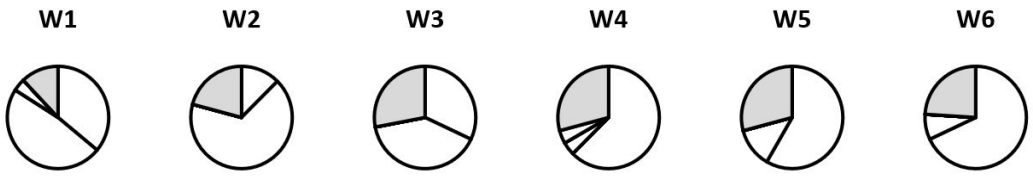


Figure 2: The diagrams of the relative frequency of individual solution procedures among the second group of participants that got to solve particular word problems, *n*=25 (for W1, W3, W6), *n*=24 (for W2, W4, W5), 2018-2019 (source: own calculation)

The case of the most frequent correct solution procedure of the task W1 is interesting from the point of view of the dynamic nature of the task and the sequential events that form the situation described by the task. As Thevenot and Oakhill (2006) showed in their research, while solving multiple-step dynamic arithmetic word problems, the order of individual calculations is usually determined by the order of events described in the assignment of the word problem. For W1, such usual order corresponds to the second solution procedure given in Table 2, i.e. to the less frequent solution procedure in the first stage and to the most frequent solution procedure in the second stage.

From the perspective of individual solvers

From the perspective of individual solvers, there were five diverse groups of participants: those who used the majority solution procedures in all relevant cases (27 participants), those who used the majority solution procedures in all but one (9 participants), those who used the minority solution procedures in all relevant cases (3 participants), those who used the minority solution procedures in all but one (5 participants) and those who used the majority and minority procedures equally (5 participants). That means that 27 + 9 = 36 of the second stage participants were majority solvers and 3 + 5 = 8 were minority solvers. The remaining 5 participants who equally provided majority and minority procedures will be called *mixed solvers*.

Back to the first stage

In order to align better the first and second stages from the perspective of individual solvers, we have to return to the first stage and to the reasoning about the task W5 that dealt with the question whether the task should be characterized as a task with evenly used procedures or as a task with majority and minority procedures. In the first stage, a certain argument led to the decision for the first option. However, since the task W5 met both the characterizations, it is possible to consider now the second option and distinguish majority and minority solution procedures of this task (the more frequent solution procedure for the first stage participants was the first one in Table 2). In that new setting, all six tasks W1 to W6 are assigned majority and minority solution procedures in both stages.

With this adjustment and while taking into account just tasks W1 to W6 from the first stage, we can obtain adjusted information about majority and minority solvers of word problems on natural numbers from the first stage. These solvers can be divided into four diverse groups: those who used the majority solution procedures in all relevant cases (9 participants), those who used the majority solution procedures in all but one (4 participants), those who used the minority solution procedures in all relevant cases (3 participants), and those who used the minority solution procedures in all but one (8 participants). That means that 9 + 4 = 13 of the first stage participants were majority solvers of tasks W1 to W6, and 3 + 8 = 11 were minority solvers of tasks W1 to W6. No mixed solvers.

The ratio of majority solvers of tasks W1 to W6 is much bigger with the second group of participants than with the first group of participants and the ratio of minority solvers is much smaller – see Figure 3 for detailed diagrams.

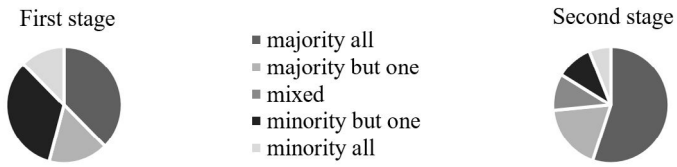


Figure 3: The diagrams of the relative frequency of various types of the tendency to use majority or minority procedures when solving word problems on natural numbers in the first stage (left, *n*=24, 2014-15) and in the second stage (right, *n*=49, 2018-19) (source: own calculation)

THE THIRD STAGE

Data collection and data analysis

During the third stage, I collected written records of solution procedures that the third group participants submitted as a part of a standard written test on rational numbers. As in the first stage, the test served as a part of the course assessment and came after the topic of rational numbers had been discussed at lectures and properly practised at course seminars. Again, the participants were divided into two almost equally sized subgroups and each of the subgroups got a different assignment of the test. The assignments were taken from the first stage: one of them comprised of word problems W7, W10 and W12, and the other one of W8, W9 and W11. The method of data analysis was the same as in the previous stages.

RESULTS OF THE THIRD STAGE

From the perspective of individual word problems – variety

In the third stage, each of the word problems had several unsuccessful participants who did not provide a solution to the problem or provided an incorrect one. The least successful were the participants at the tasks W11 where 17 of 20 failed and at the task W12 where 10 of 17 failed. The participants provided 3 to 6 different correct solution procedures to each of the word problems, the most to the word problem W9. Nine of the correct solution procedures from the third stage had not appeared during the first stage, see Table 4 for two of them.

W7	1 dumpling... 12 slices... 12/12 1 slice... 1/12 1/3 + 1/4 + 1/3 + 1/2 = 21/12 = 1 9/12 2 – 1 9/12 = 3/12 **2** dumplings **3** slices left	father 2/3 = 8/12 mother 1/4 = 3/12 daughter 4 slices son 6 slices father + mother 8 + 3 = 11 slices daughter + son 10 slices first dumpling 1 slice left second dumpling 2 slices left **2** dumplings, **3** slices left

Table 4: Two of the newly emerged correct solution procedures from the third stage

Although the third group participants were less successful in their solving than the first group participants, the variety of correct solutions to the tasks W7 to W12 can be considered as similarly wide.

From the perspective of individual word problems – usualness

Similar as in the first stage, the correct solution procedures from the third stage were either even, majority, or minority ones. Only the first solution procedure for the task W10 increased in the third stage in such a way that it changed from even to majority. The rest of the tasks did not change in their characteristics even though the task W9 had got a completely different composition of correct solution procedures: two of the three most frequent solution procedures from the first stage did not appear in the third stage at all. See Figure 4 for detailed diagrams of the relative frequency of individual solution procedures among the third stage participants. The sectors related to incorrect solution procedures are shaded in the diagrams, the sectors related to correct solution procedures are unshaded, the labels written in italics belong to word problems with evenly used correct solution procedures and the labels in bold roman belong to word problems with majority and minority correct solution procedures. The order of particular solution procedures around the diagrams in Figure 4 is the same as in Figure 1.

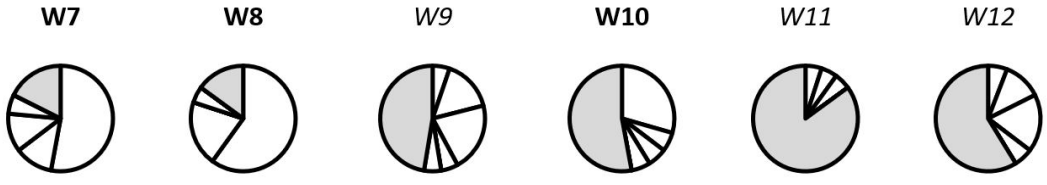


Figure 4: The diagrams of the relative frequency of individual solution procedures among the third group of participants that got to solve particular word problems, *n*=17 (for W7, W10, W12), *n*=20 (for W8, W9, W11), 2016-2017 (source: own calculation)

Emerging concerns

The groups of participants from the first, second and third stages were all rather homogenous: the participants of each group were of similar age, had come to university directly from the secondary school and had spent the two years of their university studies at common lessons (lectures and seminars) on a daily basis, including the 81 hours of the mathematics course. So that another concern emerged on how the dataset would be enriched with a less homogenous group of participants – for instance with participants attending the first year of a distance retraining study program where the attendants have diverse age, had finished their secondary school studies different times ago and are spending together just two days a month. Such participants do not have seminars on mathematics, just a condensed 10-hour lecture. Since these participants are not divided into subgroups for tests and have just one common assessment test for both the topics of natural and rational numbers, I had to choose two tasks on natural numbers and two tasks on rational numbers to include into the test. I decided to choose the task W5 that had interesting findings in previous stages, and accompanied it by three tasks with majority and minority procedures: W6, W7, W8. This choice led to the fourth stage of the study.

THE FOURTH STAGE

Data collection and data analysis

During the fourth stage, I collected written records of solution procedures that the fourth group participants submitted as a part of a standard written test on both natural and rational numbers. The test served as a part of the course assessment and came a month after the condensed lecture. All of the participants got the same assignment of the test which included word problems W5, W6, W7 and W8. The method of data analysis was the same as in the previous stages.

RESULTS OF THE FOURTH STAGE

From the perspective of individual word problems – variety

In the fourth stage, each of the word problems had several unsuccessful participants who did not provide a solution to the problem or provided an incorrect one. The least successful were the participants at the task W6 where 16 of 39 failed and at the task W8 where 15 of 39 failed. The participants provided 3 different correct solution procedures to the task W6, 5 to the tasks W5 and W8, and 6 to the task W7. Five of the correct solution procedures from the fourth stage had not appeared during the previous stages, see Table 5 for two of them.

W5	68 + 14 = 82 82: 2 = 41 41 – 14 = **27**	68 + 14 = 82 82: 2 = 41 68 – 41 = **27**

Table 5: Two of the newly emerged correct solution procedures from the fourth stage

The fourth group participants were less successful in their solving than the previous groups participants, and the variety of correct solutions was wider in the fourth stage than in the first stage but the number of solvers to each of the tasks was three times bigger than in the fourth stage. What is important is the fact that the fourth stage participants provided five correct solution procedures that had not appeared during any of the previous stages.

From the perspective of individual word problems – usualness

Similar as in the first stage, the correct solution procedures from the fourth stage were either even, majority, or minority ones. But only the characteristics of the tasks W6 and W7 stayed the same. For the task W5, the first correct solution procedure again increased from even to majority. For the task W8, the second correct solution procedure increased in such a way that it differed only by 1 from the first correct solution procedure, i.e. the task W8 changed its characteristics to the task with correct solution procedures evenly used by solvers. See Figure 5 for detailed diagrams of relative frequency of individual solution procedures among the fourth stage participants. The sectors related to incorrect solution procedures are shaded in the diagrams, the sectors related to correct solution procedures are unshaded, the labels written in italics belong to word problems with evenly used correct solution procedures and the labels in bold roman belong to word problems with majority and minority correct solution procedures. The order of particular solution procedures around the diagrams in Figure 5 is the same as in Figure 1.

Figure 5: The diagrams of the relative frequency of individual solution procedures among the fourth group of participants, *n*=39, 2019 (source: own calculation)

From the perspective of individual solvers

From the perspective of individual solvers, there were six diverse groups of participants: those who used the majority solution procedures in all relevant cases (20 participants), those who used the majority solution procedures in all but one (3 participants), those who used the minority solution procedures in all relevant cases (5 participants), those who used the minority solution procedures in all but one (2 participants), those who used the majority and minority procedures equally (7 participants) and those who were not successful with any of the tasks with majority and minority procedures (2 participants). That means that 20 + 3 = 23 of the fourth stage participants were majority solvers, 5 + 2 = 7 were minority solvers and 7 were mixed solvers.

DISCUSSION

The results of this study enriched the puzzle on the topic of *„Which aspects may affect the implementation of formative assessment in inquiry based mathematics education"* by another piece of knowledge. In an inquiry based mathematics environment, students are naturally exposed to various solution strategies which may significantly affect their own choice of solution procedures. To illustrate this aspect, I chose a group of students from the Faculty of Education (i.e. future primary school teachers) attending a one-year inquiry based mathematics course, and explored the variety of correct solution procedures provided by them to twelve word problems that had multiple correct ways of solving. To get a better insight to the problematics, I enriched the research by additional data from three other groups of participants that differed from the initial group in the form of the study program (distance retraining study instead of full-time initial teacher training), in the form of the mathematics course (non-inquiry instead of inquiry based) and/or in its time extent (condensed instead of standard).

Regarding the origin of data and the timing of data collection

A thorough observation of diagrams presented in Figures 1 to 5 can reveal that the timing of data collection stages is not consecutive in the presented research, and that there is a gap between the stages. An explanation of the causes of such a disharmony follows.

Data provided by the initial group of respondents come from the academic year 2014/15 when they were initially collected within a long-term research project that focused on possible advantages and disadvantages of employing inquiry based mathematics education in preservice primary school teacher training. The project concentrated mainly on issues related to designing and performing a one-year compulsory mathematical course fully in an inquiry based manner, and on various facets of mathematics such as reasoning, generalization or open approach (Samková and Tichá, 2016; Samková, 2017). Project data were of various nature, including written records of solutions to twelve word problems. These written records had initially been collected and analysed as a means of distinguishing levels of mathematical performance of the participants but at last the levels were not included in the final stages of data analysis. As a by-product, the initial stage of data analysis related to the written records drew my attention to various solution procedures used by project participants when solving the twelve word problems, so that I decided to revisit this part of data later to explore further its potential.

The time for such an exploration came with the research project discussed in this paper, especially with the research questions focusing on the variety and usualness of correct solution procedures. Proceeding from the initial dataset of written records of solutions to the twelve word problems, I conducted a completely new data analysis on the variety and usualness, and this analysis established the first stage of the new study presented in this paper. The course of data analysis naturally led to the need to enrich the study with other groups of participants. To preserve as many common features as possible, I searched for future primary school teachers that would undergo a mathematical course covering the same mathematics content as the whole-year course attended by the initial group of participants, including standard written tests that would form a part of the course assessment and cover all or some of the initial twelve word problems. Given the necessity to be able to influence assignments of official course assessment tests, the options were limited. One such group was available in my archive of written tests from the academic year 2016/17, with data to all the six word problems on rational numbers. This group underwent a whole-year course within the same program of initial teacher training that covered the same content and the same tasks solved at seminars as the initial course, just not in the inquiry based manner. I chose this group to address further the issues related to tasks on rational numbers. Two other suitable groups started to attend their mathematical courses at the beginning of the year 2019 when the new study started: one of them within the same program and in the same version as the group from the archive, the other within a different program and in a condensed version. The group with the same version of the course naturally became the group to address further the issues related to tasks on natural numbers, while the group with the different version became the group to address generally the issues related to diverse participants. The non-consecutive timing of stages then emerged as a result of the decision to order the description of the two stages focusing further on issues related to rational and natural numbers accordingly to the difficulty of the mathematical topics in the focus, i.e. natural numbers first. The two stages were independent, therefore, the change in order did not affect the findings.

Three of the word problems from Table 1 (W8, W9, W12) appeared also in a study presented in (Samková, 2018a), again just as a means of distinguishing levels of mathematical performance of the participants. Variety or usualness of their solution procedures were not studied there. Data for that former study were collected during the academic year 2017/18, i.e. there is no overlapping with data used in the current study.

Regarding the method of data analysis

The presented study is of an exploratory qualitative design, since the phenomena of variety or usualness have not been studied before. The purpose of the study is to explore and describe the nature of the variety and usualness, not just to quantify them. That is why the research questions begin with

„How varied" and „How usual", and not with „How many" or „How often". In accordance with the qualitative design, the course of data collection and data analysis was not fully given at the beginning of the study but was flexible – affected on the fly by the responses in various stages of the study. This particular process is described in detail at the end of the first and third stage result sections, in subsections called Emerging concerns. The emerging concerns covering the first stage were addressed in the course of the second and third stages, and the emerging concerns covering the first, second and third stages were addressed in the course of the fourth stage. The study is complete from the exploratory perspective since all the emerged concerns had been covered. The qualitative design has been also applied in the wording of the results and discussion sections, i.e. in how the findings have been interpreted. No generalization has been provided in these sections but descriptions of individual experiences and their relations: e.g. descriptions of the nature of the variety revealed by the study (different models used, different order of steps, etc.), new notions established on the basis of the study (majority procedure, majority solver, etc.), descriptions of phenomena that differed across different groups of participants (procedures used, most frequent procedures, etc.).

To get a broader overview of the issue, the qualitative results were quantitatively enriched through basic statistical methods, by using diagrams of relative frequency. These diagrams helped illustrate the qualitative findings. Any other level of statistic would provide the same quantitative results, since the twelve word problems in the study are independent (purposefully based on different didactical concepts) and there are no commonalities among the units of meaning related to different word problems.

Regarding the individual research questions

As an answer to the first research question *„How varied are correct procedures that future primary school teachers use for solving open mathematical word problems?"* I may say that the correct procedures provided by the initial group of solvers were of a really wide variety. With 11 or 13 solvers solving each of the word problems, at least two different correct solution procedures appeared to each of the twelve word problems; three of the word problems got five different correct solution procedures. The procedures differed in used models, information used from a common model, the order of steps or interpretation of the assignment. With the additional groups of solvers, sometimes the variety was similarly wide (in case of the non-inquiry full-time group solving tasks on rational numbers), sometimes was clearly smaller (in case of the non-inquiry full-time group solving tasks on natural numbers).

As an answer to the second research question *„How usual among the solvers are particular correct procedures for solving particular word problems?"* I established three new notions in the context of correct solution procedures provided by the initial group of solvers: majority, minority and even solution procedures. Five of the twelve observed word problems were with correct solution procedures evenly used by the solvers (even procedures), and seven word problems were with one correct solution procedure used by majority of the successful solvers (majority procedure) and the others by minority of the successful solvers (minority procedures). With the additional groups of solvers, some of the procedures changed their order by the relative frequency among the groups (e.g. the most frequent correct solution procedures for the tasks W1, W2, W3 were no longer the most frequent ones) or their characteristics (e.g. the most frequent correct solution procedures for the tasks W5 and W10 changed from even to majority solution procedure, the most frequent correct solution procedure for the task W8 changed from majority to even). The analysis of the additional data also contributed to the particularization of the term "even procedures".

As an answer to the third research question *„How usual among the solvers are the procedures used by particular solvers?"* I established other two new notions in the context of the initial group of solvers: majority and minority solvers. With the initial group of solvers, half of the group were majority solvers (those who tended to use majority solution procedures) and the other half were minority solvers (those who tended to use minority solution procedures). With the additional groups of solvers, there appeared less minority solvers within the groups (both in the non-inquiry full-time and distant cases) but still the minority solvers formed about 1/6 of the groups. With the distant group of solvers, also a new notion emerged referring to mixed solvers (those who used majority and minority solution procedures evenly).

Regarding the aims of the research – formative assessment

The findings about majority and minority procedures and majority and minority solvers are important for on-the-fly assessment as well as for peer-assessment.

In case of peer-assessment, the classmates who are majority solvers might not fully understand the solution procedures produced by minority solvers, and vice versa. Even the minority solvers might not understand each other when their solution procedures are based on completely different models or completely different ways of interpreting the assignment.

In case of on-the-fly assessment, the teacher might not be able to notice some specific or innovative solution procedures produced by minority solvers. The necessity of noticing, understanding and proper interpreting diverse solution procedures comes into play not only when performing inquiry based education but also in non-inquiry cases: within the group of solvers that attended the inquiry based course, the minority solvers accounted for almost half of the group, within the other (non-inquiry) groups, the minority solvers accounted for about one sixth of each of the groups.

The above mentioned circumstances raise a question important for future implementation of formative assessment into mathematics teaching: whether and how it is possible to enhance noticing, understanding and proper interpreting of different types of solution procedures. Such a question concerns noticing performed by students as well as teachers. While the topic of noticing of students appears rarely in research and mostly focuses on students noticing what a teacher is doing (Hohensee, 2016), the topic of noticing of teachers has been lately broadly discussed (Schack, Fisher and Wilhelm, 2017).

Taking into account the work of Naylor and Keogh (2007), an approach directed towards enhancing noticing, understanding and proper interpreting of different types of solution procedures by students could be based on Concept Cartoons – an educational tool that had already proved its usefulness in formative assessment in science classroom discussions. In the particular case of open mathematical word problems, the Concept Cartoons pictures may help visibly introduce into the classroom not only the majority but also the minority solution procedures and elicit discussions on them. In that context, Naylor and Keogh (2007) also pointed out that learning of students often depend on getting students to let go of their existing ideas while providing them with access to more productive ideas, and they introduced Concept Cartoons as a tool that enabled such processes by letting students to get to reflect carefully on their own ideas and to take alternative possibilities seriously.

Taking into account the work of van Es and Sherin (2008), an approach directed towards enhancing noticing, understanding and proper interpreting of different types of solution procedures by teachers should be based on changing what the teachers notice in a lesson and how they understand and interpret the noticed phenomena. Such enhancement is often promoted by watching, analysing and discussing video recordings of mathematical lessons or interviews with children (Schack, Fisher and Wilhelm, 2017; Simpson and Vondrová, 2019) or by supporting questioning practices (Spangler and Hallman-Thrasher, 2014; Milewski and Strickland, 2016).

As shown in my previous research (Samková, 2018b), this teacher oriented approach could also be based on Concept Cartoons: Concept Cartoons may help teachers get acquainted with various solution procedures that more or less probably might appear in the classroom and get trained in proper responses on them (e.g. in making decisions on correctness of procedures provided by students, discovering mistakes and their causes, posing indicative questions, anticipating students' reasoning, etc.). In that sense, Concept Cartoons may be considered as an artificially designed representation of the constituent part of school practice that is related to formative assessment (Grossman et al., 2009), and thus they may serve as a mediating tool between teaching practice and teacher education in the topic of formative assessment methods (Herbst and Chazan, 2011). Similar effect could be provided e.g. by simulated teaching experience (Webel, Conner and Zhao, 2018) or by multiple solution method and designed student responses (Evans and Swan, 2014; Evans and Ayalon, 2016). The use of Concept Cartoons that indirectly mix together content-centered and student-centered approaches might also help overcome the unwanted weak relation between content-related noticing and anticipation of other alternatives or continuations that was reported for primary school teachers by Hoth et al. (2016) as well as teacher's narrow focus on their own ideas instead on students' reasoning (Visnovska and Cobb, 2015).

To illustrate better the potential of Concept Cartoons in relation to formative assessment and the referred study, I have prepared a Concept Cartoon on the word problem W5 (see Figure 6), inspired by the most frequent incorrect solution procedure (presented in the figure by Peter) and by three correct solution procedures gained within the study and listed in Tables 2, 5.

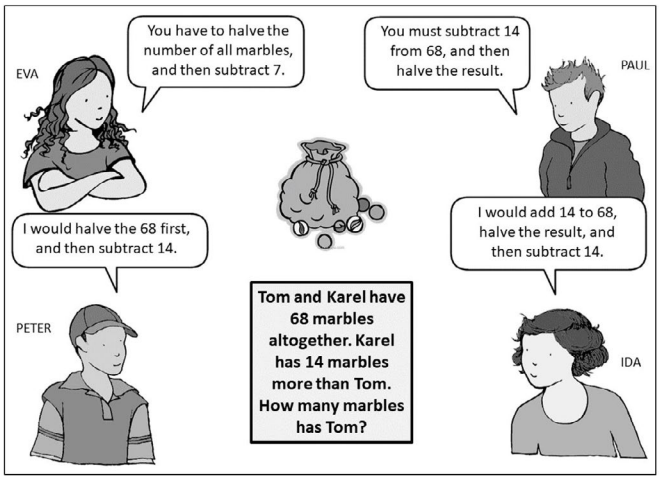


Figure 6: A newly created Concept Cartoon displaying various solution procedures of the word problem W5; (source of the template of children with empty bubbles: Dabell, Keogh and Naylor, 2008: 2.10, source of the central picture: Clipart Library, 2016)

Regarding the aims of the research – inquiry based mathematics education

The findings about majority and minority procedures and majority and minority solvers are important also from the perspective of inquiry based mathematics education regardless of the extent of formative assessment that appears in the classroom. They also confirm the potential of employing open approach to mathematics as a perspective for observing and investigating inquiry based mathematics education.

The presented study illustrates the issue of inquiry through multiple solution procedures to word tasks that belong to elementary mathematics and mostly have a unique way of interpreting the task assignment, a unique solution and a unique way of interpreting the solution. Such tasks belong to the least difficult inquiry tasks (for a detailed typology of inquiry tasks see Samková, 2017), and the reality that would appear while employing inquiry tasks that are more complicated and more difficult would reflect the situation presented in this paper and magnify it: the more the inquiry task would be open, the more instances of different interpretations, procedures and results might appear in the classroom.

Regarding other implications for school practice

The results of this study also contribute more generally to various attributes of school practice: teacher lesson planning and conducting, student learning, student attitudes.

The fact of the existence of majority and minority solvers might help teachers in preparing for and performing their lessons. Especially in case of primary school teachers who all-day work with the same group of pupils in the time span of two or three school years, the guidelines in the form of the possibility to label majority solvers and minority solvers within the group and then better anticipate the nature of their ideas and solution procedures might be really helpful. The findings may also be useful for teachers when implementing in the classroom tasks that are called multiple solution tasks – tasks that contain in their assignment an explicit requirement to solve the task in

multiple ways (e.g. Levav-Waynberg and Leikin, 2012). Each of the tasks W1 to W12 might be assigned in this way and similar analysis on usualness of combinations of individual solution procedures provided by solvers might be conducted as well.

The description of the inquiry based mathematics course where the research study took place may serve as a suggestion of how inquiry or open problems can be successfully presented to students: gradually, by starting with word problems that have a unique way of interpreting the assignment and a unique correct answer but multiple correct ways of solving, by repeatedly recording all possible solution procedures on a blackboard, discussing and defending them, and later on by incorporating word problems with multiple ways of grasping or/and multiple correct answers. When the students in focus are future teachers, such an arrangement allows them to get acquainted with the breadth of possible opinions and solution strategies that they would meet in future during their own teaching practice. Such an approach also helps easily implement both inquiry and formative assessment into preservice teacher training, and so address the usual objection about the lack of opportunities for formative assessment in preservice courses (Harlen, 2003).

The above mentioned requirement for the unique way of interpreting the assignment of a word problem also means that the practical situation that is hidden behind the problem is free of unfounded assumptions (e.g. on non-existing proportionality; for tasks rich in unfounded assumptions see Verschaffel, Greer and de Corte, 2000). The existence of unfounded assumptions is desired in advanced work with open problems (especially when aiming towards practically based modelling tasks) but really complicates the initial process of getting to know the environment of open problems as well as the related diagnostic process. Thus none of the word problems that served as diagnostic in this study could be provided by plausible unfounded assumptions.

The idea of open approach to mathematics is sometimes mistakenly considered as just a token of a certain not so common attitude to mathematics. For instance, Schoenfeld (2016) reports that the opinion that each mathematical task has a unique solution and a unique solution procedure belongs to one of the most frequent misconceptions about mathematics. Such a misconception is in clear contradiction with the topic of this paper as well as with any attempts to implement practically based or modelling tasks into mathematic lessons (Kaiser et al., 2011). I personally believe that the awareness and knowledge of various solution procedures is an integral part of mathematics knowledge that can (and should) be presented to students from their early years of schooling and its importance grows with the growing difficulty of the solved problems. When solving more complex tasks (e.g. W12), one cannot have a unique solution procedure prepared for each of these tasks. The solver has to be able to think about various contexts associated with the task and about their relations, probe various strategies of solving the task and wait which of them would lead to the required results. That problematics was clearly illustrated by the two of the most difficult word problems in the study (W11 and W12) since almost each of the successful solvers in the initial group of solvers used for solving their own solution procedure. In that sense, the aspect of usualness reported in this paper is closely related to the applicability aspect for assessing open tasks that was discussed and employed by Bulková and Čeretková (2017).

The systematic work with open problems and the existence of awareness and knowledge of unusual solution procedures of the tasks also contribute to the development of mathematical creativity and divergent thinking (Hino, 2007; Kwon, Park and Park, 2006) and have an influence on affective attributes of learning such as building the persistence of students on complex challenging tasks (Clarke et al., 2014).

As for my own professional practice, I have already incorporated some of the results of the study into my courses on mathematics and didactic of mathematics for future primary and secondary teachers, in a similar way as described in the previous paragraphs. Regardless of the amount of inquiry established for the given course, I always incorporate mathematical tasks with multiple correct solution procedures. When solving these tasks at course seminars, we try to record at least several of the procedures on a blackboard and discuss them. I also attempt to seek possible majority or minority solvers among my long-term students, to be able to provide a more apposite response to them when they face difficulties within the course seminars. Such activities take more time and effort from me as the educator since they require more detailed planning and organizing of the seminars (e.g. setting up more detailed didactical analysis of the planned tasks, taking field notes) but such an approach allows including more students to classroom discussions and seems to get students more aware of the variety of the discourse.

CONCLUSION

The presented study focused on word problems with multiple correct solution procedures and on the nature of variety and usualness of solution procedures provided to these word problems by diverse groups of participants – future primary school teachers. The initial aim of the study had originated in an effort to illustrate various attributes of inquiry based mathematics education that relate to on-the-fly assessment and peer-assessment. The results drew attention to two newly established notions, to two distinctive groups of solvers labelled as majority and minority solvers, and discussed their role in both the types of formative assessment. Such results might be utilized when particularizing the theory of formative assessment in relation to actual classroom events.

The more general aim of the study directed toward guidelines that would help particularize the form and content of a learning hyperspace that we plan to create. This hyperspace is intended for teachers, to help them implement formative assessment into their inquiry based teaching. Implications given by the findings of the study for the process of creating the hyperspace resulted in a decision to promote in teachers their awareness of the variability and usualness of correct solution procedures that might be obtained in the classroom for multiple solution word problems, and thus involve the Concept Cartoons environment into the learning hyperspace. With the help of the hyperspace, we would observe how teachers respond to more or less usual

solution procedures and whether they would be able to reveal probable pupil ideas that might have led to the procedures. We would also provide the teachers with examples of good practice related to the issue.

The findings of the study indirectly address not only teachers that intend to implement formative assessment and inquiry based education into their teaching but also all other teachers, e.g. by giving them implications for classroom work with multiple-step arithmetic word problems: at least two different solution procedures appeared to each of the word problems in the study, regardless of the form and time extent of the mathematics course that the group of solvers had been attending. Also, the minority solvers appeared noticeably in all of the observed groups.

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REFERENCES

Artigue, M. and Blomhøj, M. (2013) 'Conceptualizing inquiry-based education in mathematics', *ZDM Mathematics Education*, vol. 45, no. 6, pp. 797-810. http://dx.doi.org/ 10.1007/s11858-013-0506-6

Baptist, P. and Raab, D. (eds.) (2012) *Implementing Inquiry in Mathematics Education,* Bayreuth: University of Bayreuth, [Online], Available: https://www.fondation-lamap.org/sites/default/files/upload/media/minisites/action_internationale/2%20-%20implementing_inquiry_mathematics_education_web.pdf [26 June 2019].

Black, P. and Wiliam, D. (2009) 'Developing the theory of formative assessment', *Educational Assessment, Evaluation and Accountability*, vol. 21, pp. 5-31. http://doi.org/10.1007/s11092-008-9068-5

Bruder, R. and Prescott, A. (2013) 'Research evidence on the benefits of IBL', *ZDM Mathematics Education*, vol. 45, no. 6, pp. 811-822. http://dx.doi.org/10.1007/s11858-013-0542-2

Bulková, K. and Čeretková, S. (2017) 'Creativity as assessed attribute in mathematical open ended problem solving', in *Proceedings of EDULEARN17 Conference*, Barcelona, pp. 583-590. http://doi.org/10.21125/edulearn.2017.1126

Clarke, D., Cheeseman, J., Roche, A. and van der Schans, S. (2014) 'Teaching strategies for building student persistence on challenging tasks: insights emerging from two approaches to teacher professional learning', *Mathematics Teacher Educations and Development*, vol. 16, no. 2, pp. 46-70.

Clipart Library (2016) *Marble Bag*, [Online], Available: http://clipart-library.com/image_gallery/n735161.png [19 June 2019].

Dabell, J., Keogh, B. and Naylor, S. (2008) *Concept Cartoons in Mathematics Education*, [CD-ROM], Sandbach: Millgate House Education.

Dolin, J. and Evans, R. (eds.) (2018) *Transforming assessment,* Cham: Springer. http://doi.org/10.1007/978-3-319-63248-3

Dorier, J.-L. and Maass, K. (2014) 'Inquiry based mathematics education', in *Encyclopedia of Mathematics Education*, Dordrecht: Springer, pp. 300-304. http://doi.org/10.1007/978-94-007-4978-8_176

Evans, S. and Ayalon, M. (2016) 'Can designed student responses support teachers to interact with students in a productive way?', *Educational Designer*, vol. 3, no. 9, [Online], Available: http://www.educationaldesigner.org/ed/volume3/issue9/article33/ [26 June 2019].

Evans, S. and Swan, M. (2014). 'Developing students' strategies for problem solving in mathematics: the role of pre-designed "Sample Student Work" ', *Educational Designer*, vol. 2, no. 7, [Online], Available: http://www.educationaldesigner.org/ed/volume2/issue7/article25/ [26 June 2019].

Grossman, P., Compton, C., Igra, D., Ronfeldt, M., Shanan, E. and Williamson, P. (2009) 'Teaching practice: a cross-professional perspective', *Teachers College Record*, vol. 111, no. 9, pp. 2055-2100.

Harlen, W. (2003). *Enhancing inquiry through formative assessment,* San Francisco: Exploratorium.

Harrison, C., Constantinou, C.P., Correia, C.F., Grangeat, M., Hänkiöniemi, M., Livitzis, M., Nieminen, P., Papadouris, N., Rached, E., Serret, N., Tiberghien, A. and Viiri, J. (2018) 'Assessment on-the-fly: promoting and collecting evidence of learning through dialogue', in Dolin, J. and Evans, R. (eds.) *Transforming assessment,* Cham: Springer, pp. 83-107. http://doi.org/10.1007/978-3-319-63248-3_4

Hattie, J. (2008) *Visible learning. A synthesis of over 800 metaanalyses relating to achievement*, London: Routledge. http://doi.org/10.4324/9780203887332

Hattie, J. and Timperley, H. (2007) 'The power of feedback', *Review of Educational Research*, vol. 77, no. 1, pp. 81-112. http://doi.org/10.3102/003465430298487

Herbst, P. and Chazan, D. (2011) 'On creating and using representation of mathematics teaching in research and teacher development', *ZDM Mathematics Education*, vol. 43, no. 1, pp. 1-5. https://doi.org/10.1007/s11858-011-0306-9

Hino, K. (2007) 'Toward the problem-centered classroom: trends in mathematical problem solving in Japan', *ZDM Mathematics Education*, vol. 39, no. 5-6, pp. 503-514. http://doi.org/10.1007/s11858-007-0052-1

Hohensee, C. (2016) Student noticing in classroom settings: a process underlying influences on prior ways of reasoning,' *Journal of Mathematical Behavior*, vol. 42, pp. 69-91. http://doi.org/10.1016/j.jmathb.2016.03.002

Hošpesová, A. and Žlábková, I. (2016) 'Assessment in inquiry based education in primary mathematics', in *Proceedings of ERIE 2016,* Prague, pp. 194-201.

Hoth, J., Döhrmann, M., Kaiser, G., Busse, A., König, J. and Blömeke, S. (2016) 'Diagnostic competence of primary school mathematics teachers during classroom situations', *ZDM Mathematics Education*, vol. 48, no. 1-2, pp. 41-53. http://doi.org/10.1007/s11858-016-0759-y

Jahodová Berková A. (2017) 'Effect of the use of computer-aided assessment system in the teaching of mathematical analysis with regard to students' approaches to learning', *Journal on Efficiency and Responsibility in Education and Science*, vol. 10, no. 3, pp. 71-75. http://doi.org/10.7160/eriesj.2017.100302

Jiang, F. and McComas, W. F. (2015) 'The effect of inquiry teaching on student science achievement and attitudes: evidence from

propensity score analysis of PISA data', *International Journal of Science Education*, vol. 37, no. 3, pp. 554-576. http://dx.doi.org/10.1080/09500693.2014.1000426

Kaiser, G., Blum, W., Borromeo Ferri, R. and Stillman, G. (eds.) (2011) *Trends in teaching and learning mathematical modelling,* Dordrecht: Springer. http://doi.org/10.1007/978-94-007-0910-2

Kwon, O. N., Park, J. S. and Park, J. H. (2006) 'Cultivating divergent thinking in mathematics through an open-ended approach', *Asia Pacific Education Review*, vol. 7, no. 1, pp. 51-61. http://dx.doi.org/10.1007/bf03036784

Le Hebel, F., Constantinou, C.P., Hošpesová, A., Grob, R., Holmeier, M., Montpied, P., Moulin, M., Petr, J., Rokos, L., Stuchlíková, I., Tiberghien, A., Tsivitanidou, O. and Žlábková, I. (2018) 'Students' perspectives on peer assessment', in Dolin J., Evans R. (eds.) *Transforming assessment,* Cham: Springer, pp. 141-173. http://doi.org/10.1007/978-3-319-63248-3_6

Levav-Waynberg, A. and Leikin, R. (2012) 'The role of multiple solution tasks in developing knowledge and creativity in geometry', *Journal of Mathematical Behavior*, vol. 31, no. 1, pp. 73-90. http://doi.org/10.1016/j.jmathb.2011.11.001

Maaß, K. and Reitz-Koncebovski, K. (eds.) (2013) *Inquiry-based learning in maths and science classes. What it is and how it works – examples – experiences*. Freiburg: Pädagogische Hochschule Freiburg, [Online], Available: http://primas-project.eu/wp-content/uploads/sites/323/2017/11/primas_final_publication.pdf [26 June 2019].

MacGregor, M. and Stacey, K. (1998) 'Cognitive models underlying algebraic and non-algebraic solutions to unequal partition problems', *Mathematics Education Research Journal*, vol. 10, no. 2, pp. 46-60. http://doi.org/10.1007/bf03217342

McComas, W.F. (ed.) (2002) *The nature of science in science education,* Boston: Kluwer. http://doi.org/10.1007/0-306-47215-5

Medová, J., Bulková, K. and Čeretková, S. (2018) 'Identification of crucial competencies in mathematical inquiry', in *Proceedings of ERIE 2018,* Prague, pp. 203-212.

Miles, M.B., Huberman, A.M. and Saldaña, J. (2014) *Qualitative data analysis. A methods sourcebook*, Thousand Oaks, CA: SAGE.

Milewski, A. and Strickland, S. (2016) '(Toward) developing a common language for describing instructional practices of responding', *Mathematics Teacher Educator*, vol. 4, no. 1, pp. 126-144. http://doi.org/10.5951/mathteaceduc.4.2.0126

Minner, D., Levy, A. and Century, J. (2010) 'Inquiry-based science instruction – what is it and does it matter? Results from a research synthesis years 1984 to 2002', *Journal of Research in Science Teaching*, vol. 47, no. 4. pp. 474-496. http://doi.org/10.1002/tea.20347

Naylor, S. and Keogh, B. (2007) 'Active assessment: thinking, learning and assessment in science', *School Science Review*, vol. 88, pp. 73-79.

Nohda, N. (2000) 'Teaching by open-approach method in Japanese mathematics classroom', in *Proceedings of PME 24,* Hiroshima, pp. 35-45.

Novotná, J. and Vondrová, N. (2017) 'Pupils' strategies for missing value proportional problems', in *Proceedings of ERIE 2017,* Prague, pp. 279-286.

Pehkonen, E. (ed.) (1997) *Use of open-ended problems in mathematics classroom*, Helsinki: University of Helsinki, [Online], Available: http://files.eric.ed.gov/fulltext/ED419714.pdf [26 June 2019].

Rokos, L. and Závodská, R. (2015) 'Formative assessment and other assessment methods in biology education and pre-service biology teacher training in the Czech Republic', *International Journal of Assessment and Evaluation*, vol. 23, no. 2, pp. 17-27. http://doi.org/10.18848/2327-7920/CGP/v23i02/48388

Samková, L. (2017) 'Planning and conducting inquiry based mathematics course for future primary school teachers', in *Proceedings of SEMT '17*, Prague, pp. 354-364.

Samková, L. (2018a) 'Assessing future teachers' knowledge on fractions: written tests vs Concept Cartoons', *Journal on Efficiency and Responsibility in Education and Science*, vol. 11, no. 3, pp. 45-52. http://doi.org/10.7160/eriesj.2018.110301

Samková, L. (2018b) 'Concept Cartoons as a representation of practice', in Buchbinder, O. and Kuntze, S. (eds.) *Mathematics Teachers Engaging with Representations of Practice*, Cham: Springer, pp. 71-93. http://doi.org/10.1007/978-3-319-70594-1_5

Samková, L. (2019) 'Majority and minority correct procedures for solving mathematical word problems', in *Proceedings of ERIE 2019,* Prague, pp. 243-250.

Samková, L. and Tichá, M. (2016) 'On the way to develop open approach to mathematics in future primary school teachers', *Journal on Efficiency and Responsibility in Education and Science*, vol. 9, no. 2, pp. 37-44. http://doi.org/10.7160/eriesj.2016.090202

Savelsbergh, E.R., Prins, G.T., Rietbergen, C., Fechner, S., Vaessen, B.E., Draijer, J.M. and Bakker, A. (2016) 'Effects of innovative science and mathematics teaching on student attitudes and achievement: a meta-analytic study', *Educational Research Review*, vol. 19, pp. 158-172. http://doi.org/10.1016/j.edurev.2016.07.003

Schack, E.O., Fisher, M.H. and Wilhelm, J.A. (Eds.) (2017) *Teacher noticing: bridging and broadening perspectives, contexts, and frameworks*, Cham: Springer. http://doi.org/10.1007/978-3-319-46753-5

Schoenfeld, A. (2016) 'Learning to think mathematically: problem solving, metacognition, and sense making in mathematics', *Journal of Education*, vol. 196, no. 2, pp. 1-38. http://doi.org/10.1177/002205741619600202

Schoenfeld, A.H. and Kilpatrick, J. (2013) 'A US perspective on the implementation of inquiry-based learning in mathematics', *ZDM Mathematics Education*, vol. 45, no. 6, pp. 901-909. http://doi.org/10.1007/s11858-013-0531-5

Shavelson, R.L., Young, D.B., Ayala, C.C., Brandon, P.R., Furtak, E.M., Ruiz-Primo, M.A., Tomita, M.K. and Yin, Y. (2008) 'On the impact of curriculum-embedded formative assessment on learning: a collaboration between curriculum and assessment developers', *Applied Measurement in Education*, vol. 21, no. 4, pp. 295-314. http://doi.org/10.1080/08957340802347647

Simpson, A. and Vondrová, N. (online first, 2019) 'Developing pre-service teachers' professional vision with video interventions: a divergent replication', *Journal of Education for Teaching*, vol. 45, no. 1, pp. 567-584. http://doi.org/10.1080/02607476.2019.1674563

Spangler, D.A. and Hallman-Thrasher, A. (2014) 'Using task dialogues to enhance preservice teachers' abilities to orchestrate discourse', *Mathematics Teacher Educator*, vol. 3, no. 1, pp. 58-75. http://doi.org/10.5951/mathteaceduc.3.1.0058

Thevenot, C. and Oakhill, J. (2006) 'Representations and strategies for solving dynamic and static arithmetic word problems: the role of working memory capacities', *European Journal of Cognitive Psychology*, vol. 18, no. 5, pp. 756-775. http://doi.org/10.1080/09541440500412270

Topping, K. (2013) 'Peers as a source of formative and summative assessment', in McMillan, J.H. (de.) *SAGE handbook of research on classroom assessment*, London: SAGE, pp. 395-412. http://doi.org/10.4135/9781452218649.n22

Ulm, V. (2011) *Inquiry-based mathematics education for gifted children in primary school.* Augsburg: University of Augsburg, [Online], Available: http://www.fondation-lamap.org/en/page/27955/fibonacci-resources [26 June 2019].

van Es, E.A. and Sherin, M.G. (2008) 'Mathematics teachers' "learning to notice" in the context of a video club', *Teaching and Teacher Education*, vol. 24, no. 2, pp. 244-276. http://doi.org/10.1016/j.tate.2006.11.005

Verschaffel, L., Greer, B. and de Corte, E. (2000) *Making sense of word problems*, Lisse: Swets & Zeitlinger.

Visnovska, J. and Cobb, P. (2015) 'Learning about whole-class scaffolding from a teacher professional development study', ZDM Mathematics Education, vol. 47, no. 7, pp. 1133-1145. http://doi.org/10.1007/s11858-015-0739-7

Webel, C., Conner, K. and Zhao, W. (2018) 'Simulations as a tool for practicing questioning', in Buchbinder, O. and Kuntze, S. (eds.) *Mathematics Teachers Engaging with Representations of Practice*, Cham: Springer, pp. 95-112. http://doi.org/10.1007/978-3-319-70594-1_6

Full research paper

THE INFLUENCE OF EFL TEACHERS' SELF-EFFICACY, JOB SATISFACTION AND REFLECTIVE THINKING ON THEIR PROFESSIONAL DEVELOPMENT: A STRUCTURAL EQUATION MODELING

Ibrahim Safari[1]
Mehran Davaribina[1]✉
Iraj Khoshnevis[1]

[1] Department of English, Ardabil Branch, Islamic Azad University, Ardabil, Iran

✉ davaribina@gmail.com

ABSTRACT

This research intended to examine the influence of English as a Foreign Language (EFL) teachers' self-efficacy, job satisfaction, and reflective thinking on their professional development. Two-hundred and twelve Iranian EFL teachers from different universities, language institutes, and schools participated in the research. They were requested to answer Teachers' Sense of Efficacy Scale, The Minnesota Satisfaction Questionnaire, Reflective Thinking Scale, and Professional Development Questionnaire as the main data collection instruments. The questionnaires were submitted in three different ways: email, social networks and in person. Structural Equation Modeling on SPSS AMOS version 24 was employed to examine the hypothesized model of relationships. This model was confirmed following the application of the modification indices suggested by the software (Normal chi-square=3.6; RMSEA=.03; RMR=.02; GFI =.93; AGFI=.90; NFI=.92; CFI=.93; IFI=.93). The findings showed significant internal correlations between all the latent variables along with their sub-scales. Furthermore, multiple regression analysis showed that self-efficacy and job satisfaction positively predicted professional development, with self-efficacy exerting more predictive power compared to job satisfaction. It was further found that not only did reflective thinking not predict professional development, but, conversely, it was partly predicted by professional development. Pedagogical implications of the study have been discussed.

KEYWORDS

Job satisfaction, professional development, reflective thinking, self-efficacy, structural equation modeling

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Highlights

- *Self-efficacy has the highest impact on professional development compared to two other variables, namely job satisfaction and reflective thinking.*
- *EFL teachers' job satisfaction is a weak predictor of their professional development.*
- *Despite the hypothesized model, reflective thinking does not affect professional development; rather it is influenced by it.*
- *There is a significant positive association between EFL teachers' self-efficacy, job satisfaction and reflective thinking.*

INTRODUCTION

Teachers, as one of the determining factors in achieving the educational objectives, play a key role in every educational system. They have a critical duty in shaping and modeling habits, customs and, above all, the personality of the students. In accordance with Brosh (1996), efficient English as a Foreign Language (EFL) teachers concentrate on improving students' understanding, are in control of the language, provide

attractive issues, assist students to be autonomous, and use effective strategies in teaching. On the other hand, literature abound theoretical as well as empirical investigations which indicate that there are various factors that can influence the professional development of the teachers (e.g. Ashraf and Kafi, 2017; Lu et al., 2017; Majidinia, 2018; Marcelo, 2009; Mostofi and Mohseni, 2018; Novozhenina and López Pinzón, 2018). This implies that the teaching profession in general and EFL teaching in particular can be considered as a complex issue where a variety of interdependent variables play a role.

Further, EFL teachers' quality of teaching depends on a number of personal and social characteristics, and if these characteristics are not well developed, it can exert negative influence over the educational system and its outcome. Among the most important characteristics regarding teachers is *self-efficacy.* Self-efficacy of teachers has two dimensions: *self-efficacy of teaching*, namely, the teachers' thought in their skills in teaching and the *general self-efficacy*, which refers to his ability to influence and overcome the background of the students, which in turn is supposed to affect learners' academic achievement (Koehler, 2006).

The second characteristic of the EFL teachers, which is extensively discussed in the literature and is expected to influence their career success, is *job satisfaction*. There is a wide range of research in organizational psychology that considers the strong association between job satisfaction of the teachers and the quality of their instruction (Landsman, 2001; Rahman et al., 2014; Seashore and Taber, 1975). Having a job as one of the determinants of social health is an important part of people's life. Consequently, job-related conditions and job satisfaction have become one of the essential elements for promoting health and life satisfaction. It concerns the extent to which the job is responsive to the teacher's needs, abilities and personality traits.

Another key element which has a very crucial task in the language teachers' professional development is *reflective thinking*. In fact, for some researchers like Underhill (1986), teacher professional development is a self-reflective process of being the best kind of teacher that a person can be. There is almost a general agreement that reflectivity results in professional development and that without systematic reflection, professional development is unlikely to occur (Wildman et al., 1990). Nunan and Lamb (1996) claimed that teachers' reflection on their teaching and on the process, developing knowledge and theories of teaching play a pivotal role in this lifelong process. Reflection is also considered as a process that can support teaching, understanding and learning and has a main role in the professional development of teachers.

The fourth characteristic of the EFL teachers, which has received extensive attention in the literature, is *professional development* (PD). As Kyndt et al (2016) stated, teachers should develop their skills, knowledge and other qualifications regarding new needs and findings in the field of teaching. This is related to changes in teacher recognition, professional attitude and educational knowledge. Professional development is an early mechanism that educational systems can employ to help teachers continuously improve their skills.

EFL teacher's quality of teaching depends on a number of personal and social characteristics, and if these characteristics encounter problems, it can exert negative influence over the educational system and its outcome. This might be the reason why PD has been extensively studied and many efforts have been made to find different factors influencing the construct (e.g. Ashraf and Kafi, 2017; Day, 1999; Lu et al. 2017; Majidinia, 2018; Mostofi and Mohseni, 2018; Muhammed Amanulla and Aruna, 2014; Novozhenina and López Pinzón, 2018). There are several reasons why teachers should be involved in effective PD, with the primary purpose of improving teacher and student performance. Harnett (2012) investigated the idea that there is increasing importance in the role of teacher with regard to student success. If teachers can effectively learn new skills and promote their careers, they would see its benefits in their students' achievements.

Keeping the four above-mentioned variables into consideration, variations in possible interrelationships among these teacher variables are quite likely to influence the outcome of an educational program and hence need to be widely explored. Put differently, since effective teachers are fundamental to the achievement of educational goals and objectives, exploring factors influencing the professional development of EFL teachers in particular can be quite illuminating. Nevertheless, to the best of the authors' awareness, not many researches have been carried out to explore the association between factors such as teacher self-efficacy, job satisfaction and reflective thinking and their influence on professional development particularly using structural equation modeling and the few existing studies have explored and examined the effect of these factors in isolation.

LITERATURE REVIEW

This section is purporting to present an overview of the theoretical underpinnings of the study as well as the empirical research conducted about the four latent variables under investigation, namely EFL teachers' self-efficacy, job satisfaction, reflective thinking and professional development.

Self-Efficacy

Teachers' self-efficacy is defined as the degree to which the teachers think they can influence the behavior and academic success of students (Berman et al., 1977). The concept of self-efficacy derived from cognitive-social theory and the works of the well-known psychologist Albert Bandura, who defined self-efficacy as people's beliefs or judgments about their ability to successfully perform duties and responsibilities. Self-efficacy does not refer to skills, but to the belief in the ability to do work in different job positions. Skills can easily be affected by hesitation, resulting in people that are very susceptible to lower self-esteem in situations where they have a weak belief in themselves (Bandura, 1977). Investigators have argued that people with higher degree of self-efficacy focus on wider career opportunities and have more job prospects; they have higher personal goals and better mental health. Self-efficacy can also increase mental health and ability to do things and make people more resistant to job stress (MirSami and Ebrahimi Ghavam, 2007).

Bandura (2006) believes that self-efficacy in the first place is a belief and then action; therefore, to strengthen it, one should first and foremost create an effective attitude toward oneself. Then he should be instructed to identify ways to succeed; to be aware of situations, perceptions, interpretations and evaluations, and to have a positive mood to face the challenges. Individuals who are confident about their capabilities consider problems as challenges that must be dominated, rather than threatened and avoided. They will choose to challenge goals and will all remain committed to doing it. They will be confident to control threatening situations, reducing their perception of stress and depression.

In the same vein, Bandura (2008: 32) argued that having knowledge and skills is one thing and 'being able to use them well and personal accomplishments require not only skills but self-beliefs of efficacy to use them well. For this reason, people with similar constituent skills, may perform differently depending on their self-efficacy beliefs'.

According to Koehler (2006), for a long time, many researches have been conducted on the self-efficacy of instructors and several tools have been designed to measure this concept. Tschannen-Moran and Woolfolk Hoy (2001), succeeded in designing teachers' sense of efficacy scale (TSES). Studies have shown that this scale has a fixed and unitary structure for measuring self-efficacy and takes *educational approaches*, *classroom management*, and *student engagement* into account. The three-factor structure of this scale provides useful information about the self-efficacy of a teacher. The most remarkable critique on this scale is that it does not measure the general self-efficacy of teaching (Koehler, 2006). Koehler designed a set of questions that measured the general self-efficacy of teaching, in conjunction with the design of a tool that comprehensively measures teacher's self-efficacy and added them to the "teacher's Sense of Efficacy Scale". Factor analysis has shown that the questions about two dimensions of self-efficacy for "educational approaches" and "class management" are complete and efficient.

The construction of self-efficacy scales led to the emergence of a number of empirical researches in the academic fields, which set out to investigate how this variable is vital in students' achievement (e.g. Chýlová and Natovová, 2013; Köseoğlu, 2015; Meral, Colak, and Zereyak 2012; Natovová and Chýlová, 2014) and teacher' effective teaching (e.g. Babaei and Abednia, 2016; Malmir and Mohammadi, 2018; Rahimi and Weisi, 2018; Rots et al., 2007). Babaei and Abednia (2016) investigated the association between teachers' self-efficacy and reflective teaching. Two questionnaires were distributed among 225 Iranian EFL teachers. Data analysis showed a significant positive association between the factors of teachers' self-efficacy and reflectiveness. The results of multiple regression determined Efficacy for Learner Engagement as the only predictor of teacher reflectiveness and Meta-Cognitive Reflection as the only predictor of teacher self-efficacy. Using Structural Equation Modeling, most of the sub-scales of both variables were significantly correlated, some were not, and Cognitive Reflection and Efficacy for Classroom Management had a negative association.

Rahimi and Weisi (2018) conducted a study to investigate the relationships among EFL teachers' self-efficacy and reflective practices. The findings of multiple correlation analyses indicated significant positive relationships between these two variables. In another research related to teachers' self-efficacy, Malmir and Mohammadi (2018) set out to find out whether the EFL teachers' self-efficacy and reflective thinking can predict their professional development. The results proposed that if EFL teachers improve their reflective thinking and self-efficacy, they will have higher professional development.

Job Satisfaction

It is necessary to mention that the real aspects of job satisfaction that make people leave their jobs are different and vary according to the experience of people in the organization. The level of job satisfaction is influenced by a wide range of factors related to the internal and external factors of the individuals. It is primarily influenced by the internal organizational environment, which includes organizational climate, leadership style and personnel relationships (Seashore and Taber, 1975). Therefore, recognizing the needs, motivations, and tendencies as well as factors of satisfaction and dissatisfaction of teachers is not only necessary, but also for the adoption of proper policies, appropriate strategies and effective programs are essential. Job satisfaction has widely been considered as an effective factor for increasing the efficiency and success of teachers. Teachers as the most important side of the educational system should be interested in their work in order to develop their potential talents.

Hollyene (2007) conducted a research to find out the Predictors of Teachers' Job Satisfaction. The results revealed that teachers' main concerns about job satisfaction revolved around the issues such as facilities, time, and resources, and to some extent around the professional development. Later, Rahman et al. (2014) investigated the role of job satisfaction in association with organizational citizenship behavior and self-efficacy. The findings revealed that when teachers have high self-efficacy, they also have high job satisfaction and, as a result, have better citizen behavior than others.

Errhouni (2017) conducted a study to investigate the relationship between self-efficacy and job satisfaction. The findings proposed that self-efficacy has a positive relationship with job satisfaction. In another study, Karabiyik and Korumaz (2014) aimed to find the relationship between teachers' self-efficacy perceptions and job satisfaction level. The results revealed that there is a positive and significant relationship between teachers' self-efficacy perceptions and job satisfaction level. Türkoğlu, Cansoy and Parlar (2017) attempted to examine the relationship between teachers' self-efficacy and their job satisfaction. Regarding the results, teachers' self-efficacy correlated positively with job satisfaction. It indicated that an increase in teachers' perceptions of self-efficacy will heighten their job satisfaction.

Bilač and Miljković (2017) conducted a study to examine the effect of reflective practice on the level of job satisfaction after a professional training. The findings did not represent an effect for reflective practice on job satisfaction. Demirdag (2015) conducted a study to examine the relationship between self-efficacy and job satisfaction of middle school teachers.

The findings indicated that there is non-significant negative correlation between teacher self-efficacy and job satisfaction.
Landsman (2001) found that job satisfaction significantly influenced commitment. Results of the study confirmed that employee satisfaction significantly predicted employee job engagement. Therefore, it was concluded that teachers' job satisfaction helps their commitment.
Last, but not the least, Bhat (2018) carried out a research on the role of gender differences (male and female teachers) and various types of school (public and private) on teachers' job satisfaction. Findings revealed that there was no significant difference between male and female teachers as well as public and private teachers regarding their job satisfaction.

Reflective Thinking

Reflective thinking has a close association with metacognitive reasoning, through which an individual examines his/her reasoning procedure and recognizes his/her thinking conduct. In reflective thinking, the individual ponders over his/her reasoning and learning styles. Also, reflective and metacognitive thinking require building up an association with past encounters, to make inquiries about the information learned, and to make inquiries of him/her in the learning process. Moreover, reflective thinking is an ability which can be shown in parallel with the improvement in person's self-control forms.
Albeit many endeavors in the domain of English language teaching have been centered on reflective thinking, the researchers observe a lack of focus on the relationship between efficacy of classroom management and reflective thinking especially in EFL setting. According to Posner (1985), examination on teachers' reflective thinking enables us to act in purposeful and deliberate courses, to devise better approaches for instruction. Zalipour (2015: 4) argues, 'Reflective practice challenges teachers who have unquestioned assumptions about good teaching, and encourages them to examine themselves and their practices in the interest of continuous improvement'.
Concerning the empirical studies, Baleghizadeh and Javidanmehr (2015) intended to investigate whether EFL teachers' reflectivity and its main components are capable to predict those teachers' sense of self-efficacy. The results of multiple regression analysis showed the predictive power of reflectivity and its sub-scales on teachers' self-efficacy.
Mirzaei, Aliah Phang, and Kashefi (2014) conducted a study to specify the ways to increase teachers' reflective thinking skills. They compared reflective thinking skills between experienced and inexperienced teachers in different levels. They concluded that utilizing reflective thinking tools is an important way to improve reflective thinking skills of teachers.
Noormohammadi (2014) conducted a research to investigate the association between EFL teachers' efficacy and their reflection as well as the association between different components of self-efficacy and reflection by means of a new English language teacher reflective inventory. The findings revealed that there was a significant positive association between teachers' self-efficacy and reflective practice; also self-efficacy had positive association with reflection elements. According to the results, reflection increases job satisfaction and assists teachers to improve their confidence and independence in determining the policy of school or institutes.
There are different characterizations of reflective thinking, among which Choy and Oo's (2012) scientific categorization has been widely acknowledged. Reflective thinking in this characterization incorporates four measurements: (1) reflection as retrospective analysis (Ability to self-evaluate); (2) reflection as problem solving (Awareness of how one learns); (3) critical reflection of self (creating nonstop personal development); (4) reflection on beliefs about self-efficacy. Taking these four measurements together, one can presume that reflective teachers are increasingly mindful about the current circumstance and they are progressively arranged to make a move in critical circumstances, for example, confronting a problematic conduct and upgrading discipline in the classes.
Larrivee and Cooper (2006) stated that reflective teachers give a great deal of time to considering classroom cooperation, guidance and management and think about both the proposed and also the unintended outcomes of activities. Using a structural equation modeling technique, Choy, Yim and Tan (2017) studied a reflective thinking model among teachers using 1070 pre-school teachers in Malaysia. The findings showed that reflective thinking leads to teachers' self-efficacy, evaluation and instructional awareness.

Professional Development

Teachers' professional development (PD) is viewed as a procedure that should be developed in the universities, schools and institutes. Besides, it is viewed as a contribution to the development of their professional skills, using different experiences. Teachers' professional development is a very expanded area of study. Therefore, in this section, the researcher tried to demonstrate some of its general and related ideas. Day (1999: 4) believed, 'Professional development consists of all natural learning experiences and those conscious and planned activities which are intended to be of direct or indirect benefit to the individual, group or school, which contribute, through these, to the quality of education in the classroom'.
There are many empirical studied in the field of teachers' professional development (e.g. Ashraf and Kafi, 2017; Lu et al., 2017; Majidinia, 2018; Mostofi and Mohseni 2018; Muhammed Amanulla and Aruna, 2014; Novozhenina and López Pinzón, 2018; Suchánková and Hrbáčková, 2017; Uştuk and Çomoğlu, 2019). Ashraf and Kafi (2017) attempted to find out the relationship between Iranian EFL instructors' professional development and their philosophy of education. More specifically, it aimed to explore whether EFL teachers' philosophy of education sub-scales can be seen as some significant predictors of their professional development. After analyzing the data, the findings showed that "Perennialism" as one of the philosophies of education sub-scales was believed to have the significant association with Iranian EFL teachers' professional development as well as becoming the only significant predictor of the professional development.
Majidinia (2018) intended to examine the association between teachers' PD and their emotional intelligence. The results demonstrated that there was a positive and significant association between these two constructs. Novozhenina and

López Pinzón (2018) intended to improve the teaching practice and self-reflection of EFL teachers by means of a professional development program. The results showed that even though the program initiated little changes in the performance and reflection of teachers, it still left space for more improvement and training.

Muhammed Amanulla and Aruna (2014) conducted a research to identify the impact of teacher efficacy on professional development of higher secondary school teachers. The results revealed that there was a significant and positive relationship between teachers' efficacy and their professional development.

Lu et al. (2017) evaluated the effect of Teacher Professional Development Programs on Students' Achievement in China. They found no effect for professional development on students' achievement. In fact, the findings revealed that teachers may have enhanced their teaching knowledge from Professional Development Programs, but did not use what they learned to enhance students' learning or teaching practices. Mostofi and Mohseni (2018) set out to investigate the influence of classroom management types (authoritative, democratic, and laissez-faire) on professional development of Iranian EFL teachers. The findings revealed that type of classroom management style had a significant influence on teachers' professional development. The results also indicated that all three class management styles had a significant influence on teachers' professional development.

PURPOSE OF THE STUDY

Taking the above-mentioned critical factors into account, it is quite wise to assume that having effective teachers in order to achieve the objectives of an educational program is undeniable. As mentioned above, this research was an effort to examine the association and interaction between three determining aspects of EFL teachers' social cognitive behavior, namely their self-efficacy, job satisfaction and reflective thinking and the influence of these variables on professional development. This can be quite innovative in the sense that previous researches have not considered all these variables in a single study and employing the potential features and outcomes of structural equation modeling and multiple regressions can shed more light on how these teacher variables may interact and influence each other in the way to lead to professional development. Put differently, the present research expanded previously conducted researches using a proposed model of possible associations among the given variables by means of structural equation modeling (SEM). Therefore, a more detailed model (Figure 1) was presented to show the probable association between teachers' self-efficacy, job satisfaction, reflective thinking and professional development.

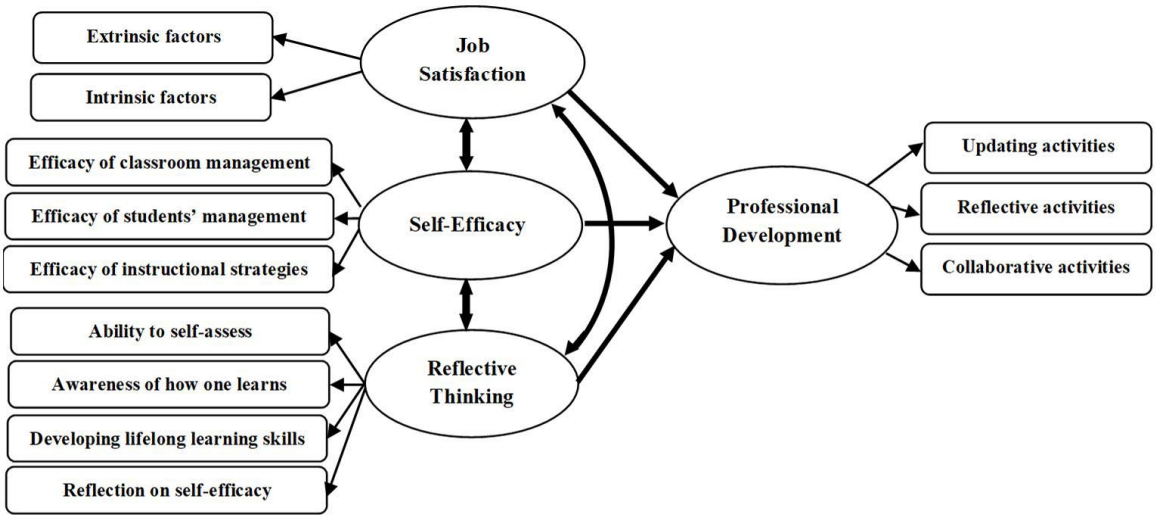

Figure 1: The hypothesized model of the relationships between the variables, 2018-2019

RESEARCH QUESTIONS

In order to achieve the above-stated research purposes, these research questions were posed:

1. Does EFL teachers' self-efficacy have any effect on their professional development?
2. Does EFL teachers' job satisfaction have any effect on their professional development?
3. Does EFL teachers' reflective thinking have any effect on their professional development?
4. Is there any statistically significant association between EFL teachers' self-efficacy and their job satisfaction?
5. Is there any statistically significant association between EFL teachers' self-efficacy and their reflective thinking?
6. Is there any statistically significant association between EFL teachers' job satisfaction and their reflective thinking?

MATERIALS AND METHODS

Context and Participants

The participants consisted of 212 EFL teachers (131 males and 81 females) working in educational centers (universities, schools and language institutes) from 8 different provinces of Iran. It is worth mentioning that totally 334 questionnaires were distributed among the original pool of the participants. Out of this, 193 copies were sent via email and social networks (mainly WhatsApp and Telegram) and the remaining 141 copies

were distributed in paper form. As mentioned previously, 212 teachers filled out the questionnaires and sent them back, which formed the main data for the study. These participants consisted of both novice and experienced teachers with their active working years ranging from 5 to 35. They ranged in age from 25 to 65 with most teachers aging between 30 to 40. Upon distributing the questionnaires, all EFL teachers were introduced to the objectives and importance of completing the questionnaires. The confidentiality of the results of the research was also announced to these teachers in order to participate more confidently.

Instrumentation

To collect the data, four questionnaires were used, namely, (1) Teachers' Sense of Efficacy Scale, (2) Job Satisfaction Questionnaire, (3) Reflective Thinking Questionnaire, and (4) Professional Development Questionnaire.

Teacher Sense of Efficacy Scale (TSES)

Teacher Sense of Efficacy Scale, prepared by Tschannen-Moran and Woolfolk-Hoy (2001), includes 24 items and is divided into three factors: Efficacy of classroom management (8 Items), efficacy of students' management (8 Items) and efficacy of instructional strategies (8 Items). The participants will be asked to report their beliefs on a scale of 1 to 9, with 1 meaning "nothing," 3 meaning "very little," 5 meaning – "some influence", 7 meaning – "quite a bit", and 9 meaning – "a great deal". The reliability of the questionnaire was estimated to be.87.

The Minnesota Satisfaction Questionnaire (MSQ)

The Minnesota Satisfaction Questionnaire was created by Weiss et al. (1967). This scale comprises 20 items and includes two constructs namely *intrinsic satisfaction* with 14 items and *extrinsic satisfaction* comprising 6 items. The respondents are expected to answer on a five-point Likert scale from 1= Very dissatisfied to 5= Very satisfied. The reliability of the questionnaire turned out to be .89.

Reflective Thinking Questionnaire (RTQ)

Teachers' reflective thinking questionnaire designed by Choy and Oo (2012), consists of four areas of reflective thinking: *Ability to self-express* (12 Items), *awareness of how one learns* (9 Items), *developing lifelong learning skills* (9 Items), and *belief about self and self-efficacy* (3 Items). This questionnaire is utilized a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). Cronbach alpha was applied to estimate the reliability of the test indicated a reasonable internal consistency among the items (α=.91).

Professional Development Questionnaire (PDQ)

Professional development questionnaire was prepared by De Vries, Jansen, and Grift (2013). This questionnaire consisted of 40 items under three factors: *updating activities* (11 items), *reflective activities* (13 items) and *collaborative activities* (16 items). This was also a Likert-type scale with 1 meaning "Not applicable", 2 meaning "Disagree", 3 meaning "Somewhat applicable", and 4 meaning "Fully applicable". The reliability of the scale was assessed and approved (α=.88)

Data Collection Procedure

Once the questionnaires were piloted with a group of 26 colleagues, minor modifications were made in the wordings of some items in order to improve their intelligibility. Also, the scores obtained from these participants were fed into SPSS and Cronbach's alpha was computed for the scales (see instruments section above for details) to make sure the scales were sufficiently reliable. It should be mentioned that a group of colleagues in eight different provinces of Iran were contacted and asked to distribute the questionnaires among their own colleagues and ask for their cooperation. As mentioned previously, the questionnaires were delivered to 141 teachers in person and 193 copies were sent via email or social networks (mainly Telegram and WhatsApp). In total, out of 334 teachers contacted, 212 teachers answered the questionnaires and returned them. These questionnaires were scored and the obtained data were fed into SPSS. It is worth mentioning that the negatively worded items were reverse-coded and the necessary preliminary computations were run to prepare the data for the AMOS and test the hypothesized model afterwards.

Data Analysis

Once the data of the study were collected using four different questionnaires related to our latent variables, SEM analysis was run using SPSS AMOS version 24 to test these relationships in the path model. The SEM consists of two main phases: exploratory factor analysis and confirmatory factor analysis. The exploratory factor analysis is employed to examine whether the sub-scales are associated with their own latent variables; this includes some statistical procedures such as KMO-Bartlett Test and Correlational Matrix. Confirmatory factor analysis, on the other hand, aims to validate or confirm the hypothesized model using goodness of fit indices, and examining all the relationships between the latent variables and their sub-scales.

According to Hoyle and Panter (1995), the following fit indices are used to estimate the fitness of the hypothesized model: Normal chi-square, Root Mean Squared Error of Approximation (RMSEA), the goodness of-fit-index (GFI), the incremental fit index (IFI), and the comparative fit index (CFI). As Hoyle and Panter (1995) stated the values of GFI, IFI, and CFI range from 0 to 1.0, with the values closer to 1.0 commonly representing better fitting models. In addition, the loading factors show the high correlation between each latent variable and its sub-scales. In order to demonstrate model path predictions, two statistical analyses such as Spearman bi-variate correlations and multiple regression analysis were conducted.

RESULTS

As mentioned above, a number of statistical procedures were implemented to answer the research questions. Descriptive statistics, correlation matrix, KMO and Bartlett's test, SEM, and Multiple regressions were utilized to serve these purposes. Table 1 shows descriptive statistics for all the sub-scales of the latent variables.

It can be perceived from Table 1 that the continuous variables are not normally distributed (Skewness and Kurtosis < 2), therefore, Spearman bi-variate correlation was used instead of Pearson product-moment correlation in order to compute the interrelation between these variables.

Table 2 presents the correlation matrix of the sub-scales and their related latent variables. As it is clearly represented in table 2, there is a relatively significant correlation between latent variables of the study with the highest correlation between self-efficacy and job satisfaction and their sub-scales. Furthermore, not only are all latent variables of the study strongly related to their sub-scales, but also some of sub-scales are related to other latent variables and sub-scales. As a case in point, self-efficacy is correlated with all the sub-scales of job satisfaction, reflective thinking and professional development. Interestingly, there was a higher correlation between self-efficacy and job satisfaction in comparison with the reflective thinking and professional development.

Latent Variables	Sub-scales	N	Mean	SD	Skewness	Kurtosis
Self-efficacy	1. Efficacy of classroom management	212	4.14	.46	-.39	-.68
	2. Efficacy of students' management	212	4.04	.35	.11	1.41
	3. Efficacy of instructional strategies	212	4.21	.43	-.13	-.94
Job Satisfaction	4. Intrinsic factors	212	4.14	.36	-.36	.24
	5. Extrinsic factors	212	3.98	.49	-.56	-.21
Reflective Thinking	6. Ability to self-assess	212	3.88	.26	-.27	1.98
	7. Awareness of how one learns	212	3.50	.33	.82	2.79
	8. Developing lifelong learning skills	212	3.72	.32	-.12	-.67
	9. Reflection on self-efficacy	212	4.38	.56	-.80	.08
Professional Development	10. Updating activities	212	3.31	.37	-1.13	2.13
	11. Reflective activities	212	3.24	.40	-.85	1.12
	12. Collaborative activities	212	3.09	.37	-.59	1.95

Table 1: Descriptive statistics for all sub-scales of latent variables, 2018-2019

Variables	Self-efficacy	Classroom management	Students' management	Instructional strategies	Job satisfaction	Intrinsic satisfaction	Extrinsic satisfaction	Reflective thinking	Ability to self-assess	Awareness of how one learns	Developing lifelong learning skills	Reflection on self-efficacy	Professional development	Updating activities	Reflective activities	Collaborative activities
Self-efficacy	1.00															
Classroom management	.86	1.00														
Students' management	.74	.43	1.00													
Instructional strategies	.87	.65	.49	1.00												
Job satisfaction	.64	.60	.49	.51	1.00											
Intrinsic satisfaction	.56	.48	.42	.50	.86	1.00										
Extrinsic satisfaction	.62	.59	.35	.42	.92	.60	1.00									
Reflective thinking	.58	.41	.55	.42	.41	.40	.34	1.00								
Ability to self-assess	.37	.24	.34	.34	.24	.32	.13	.69	1.00							
Awareness of how one learns	.16	.16	.23	.04	.09	.02	.12	.48	.23	1.00						
Developing lifelong learning skills	.45	.43	.20	.44	.32	.32	.26	.63	.42	.26	1.00					
Reflection on self-efficacy	.28	.23	.19	.28	.34	.33	.29	.71	.32	.03	.15	1.00				
Professional development	.61	.50	.48	.54	.52	.49	.45	.35	.28	-.06	.23	.37	1.00			
Updating activities	.58	.49	.40	.54	.31	.32	.24	.29	.28	.02	.28	.19	.83	1.00		
Reflective activities	.51	.44	.41	.42	.61	.52	.56	.38	.24	-.06	.19	.46	.82	.49	1.00	
Collaborative activities	.44	.31	.37	.41	.38	.37	.32	.20	.18	-.12	.11	.26	.85	.60	.54	1.00

Table 2: Correlation matrix for the latent variables and their sub-scales, 2018-2019

Considering the one by one correlation between sub-scales of the study, it can be seen that the highest correlation is between "efficacy of classroom management" under self-efficacy and "extrinsic factors" under job satisfaction (r=.62). On the other hand, the lowest correlation is between "awareness of how one learns" belonging to reflective thinking and "collaborative activities" under professional development (r=-.12). Moreover, all the sub-scales of job satisfaction are significantly correlated with self-efficacy.

Despite multiple relationships between the latent variables and their different sub-scales, simple correlation analysis (due to the measurement errors), cannot be considered as a powerful confirmatory measure. To further approve the relationships among variables of the hypothesized model, both the exploratory and confirmatory analyses of SEM were applied.

To meet this objective, Bartlett test was employed to find out whether all of the sub-scales were correlated within themselves and with their own latent variables. It is necessary to mention that finding of the Bartlett test should be significant (p<.05). On the other hand, KMO test was used to assess the adequacy of the sample. This test combines the correlations and partial correlations to see if each sub-scale sufficiently loads on its related factor. The value of KMO test should be between.5 and.9. A small value for KMO (lower than.5) denotes that there is a problem in sampling procedure. Therefore, variables with small values should be removed.

Variables		Self-efficacy	Job satisfaction	Reflective thinking	Professional development
KMO measure of sampling adequacy		.662	.512	.590	.695
Bartlett's test	Approx. Chi-Square	181.100	97.020	86.702	180.554
	df	3.000	1.000	6.000	3.000
	p-value	.000	.000	.000	.000

Table 3: KMO and Bartlett's test, 2018-2019

As can be seen from Table 3, all of the statistics for KMO measure were greater than.5 indicating the sampling appropriateness. Moreover, confidence level of.00 for Bartlett's test verifies the appropriateness of the factor model for all of the latent variables.

In accordance with Jöreskog and Sörbom (1996), the goodness of fit indices for the model was evaluated employing maximum likelihood estimation approach in AMOS version 24.

More specifically, these fit indices were used to assess the fitness of the hypothesized model: Normal Chi-square ($\left(\frac{x^2}{df}\right) < 5$), Root Mean Squared Error of Approximation (RMSEA<.05), Root Mean Squared Residual (RMR ≥ 0), Goodness-of-Fit Index (GFI>.9), Adjusted Goodness-of-Fit Index (AGFI>.85), Normal Fit Index or Bentler-Bonett Index (NFI>.90), Comparative Fit Index (CFI>.90) and Incremental Fit Index (IFI >. 90). The values of GFI, IFI, and CFI range from 0 to 1.0, with values closer to 1.0, according to Hoyle and Panter (1995), generally representing high and better fitting models. Eight criteria employed to estimate the fit statistics of the model are represented in table 4.

Evaluation	Acceptable level	Current level	Fit statistics
Normal Chi-Square	$\left(\frac{x^2}{df}\right) < 5)$	3.60	Accept
Root Mean Squared Error of Approximation	RMSEA<.05	.03	Accept
Root Mean Squared Residual	RMR≥.00	.02	Accept
Goodness-of-Fit Index	GFI>.90	.93	Accept
Adjusted Goodness-of-Fit Index	AGFI>.85	.90	Accept
Normal Fit Index or Bentler-Bonett Index	NFI>.90	.92	Accept
Comparative Fit Index	CFI>.90	.93	Accept
Incremental Fit Index	IFI>.90	.93	Accept

Table 4: Structural equation model: fit statistics, 2018-2019

According to Table 4, all indices are accepted for the self-efficacy, job satisfaction, reflective thinking and professional development model (Normal Chi-Square=3.6; RMSEA=.03; RMR=.02; GFI=.93; AGFI=.90; NFI=.92; CFI=.93; IFI=.93).

The schematic representation of the modified model, accepted based on the criteria above, is shown in Figure 2. The figure also shows the standardized path correlations between the latent variables as well as their sub-scales.

As represented in figure 2, some positive inter-group correlations exist, the highest of which was between self-efficacy and job satisfaction.

The results of the correlation analysis discussed before show different bi-variate relationship between the research measures. However, these bi-variate analyses cannot indicate the influence of one measure on another. Multiple regressions are required in prediction of determining which independent variable accounts for which dependent variable(s).

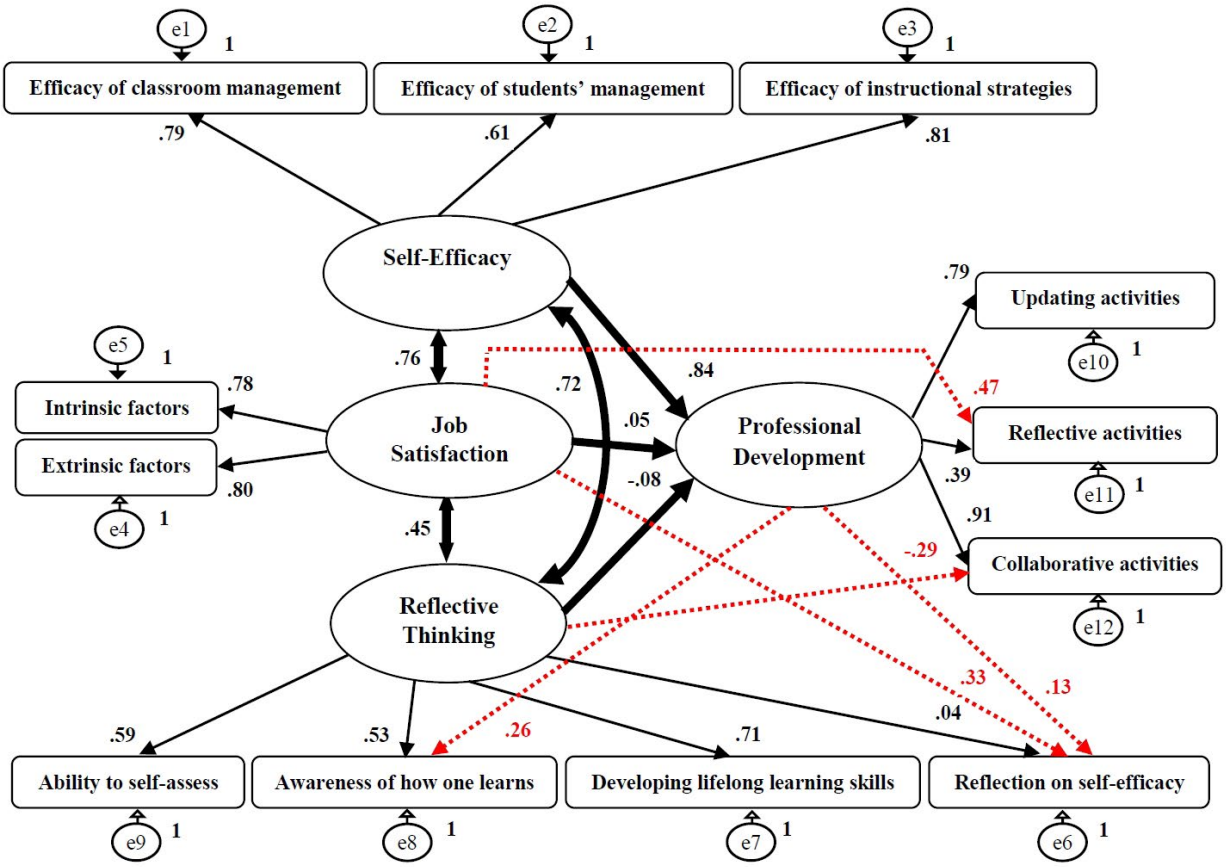

Figure 2: Structural equation modeling in standardized estimates after modification of the hypothesized model, 2018-2019

As Table 5 shows, self-efficacy predicts professional development (B=.41, t=6.25, p-value=.000) more strongly than job satisfaction (B=.28, t=3.23, p-value=.01) and reflective thinking (B=.04, t=.711, p-value=.478). According to independent variables' B and t values, self-efficacy and job satisfaction are positive predictors of professional development.

Predictor	*B*	*t*	*p*-value
(Constant)	1.506	1.722	.087
Self-efficacy	.716	6.255	.000
Job satisfaction	.684	3.239	.001
Reflective thinking	.044	.711	.478

Table 5: Multiple regression analysis predicting teachers' professional development

DISCUSSION

Using structural equation modeling (SEM), the current research intended to simultaneously explore the interrelationships between three latent variables namely, self-efficacy, job satisfaction and reflective thinking and their influence on professional development. It is worth mentioning that this research extended the previous similar studies through investigating the relationship between above mention variables concurrently and used more accurate analysis techniques.

It was found that, all of the sub scales of the latent variables, namely self-efficacy, job satisfaction, reflective thinking and professional development were highly correlated with their own latent variables with self-efficacy having the highest correlation with its sub-scales. By applying the SEM, the main results of this research confirmed the hypothesized model of relationship between the principal variables but with some modifications. Among these correlations, the highest correlation related to the teachers' self-efficacy and their job satisfaction. According to the findings, self-efficacy predicts professional development more strongly than job satisfaction and reflective thinking. What follows is intending to examine the relationships of these four variables mentioned above to answer the research questions.

The first research question aimed to examine direct or indirect effect of EFL teachers' self-efficacy on their professional development. The structural equation modeling in standardized estimates illustrated that self-efficacy had the highest effect on professional development (.84) in comparison with other latent variables, i.e., job satisfaction (.05) and reflective thinking (-.08). Furthermore, multiple regression analysis showed that self-efficacy predicts professional development more strongly than job satisfaction and reflective thinking. This finding corroborates Muhammed Amanulla and Aruna (2014), who stated, there was a significant and positive relationship between teachers' efficacy and their professional development. Their results indicated that increase in teachers' efficacy will cause the increase in their professional development and vice versa. Later, Malmir and Mohammadi (2018) conducted another study to find out the effect of

EFL teachers' self-efficacy on their professional development in which he concluded that EFL teachers' self-efficacy can predict their professional development. He recommended that if EFL teachers improve their self-efficacy, they will have more professional development. It would then be quite wise to assume that EFL teachers with the high degree of self-efficacy enjoy higher degrees of professional development. One probable justification for the results obtained from the previously conducted researches and the present research could be that those teachers who care about the management of their classes and students are determined to update their professional activities and reflect more on their classroom as well as student performance data in order to adjust their teaching and employ the latest findings in terms of instructional strategies. It could also be assumed that those teachers who tend to employ the latest findings in terms of instructional strategies would be more inclined to engage in more collaborative activities with their colleagues to have access to these updates.

The second research question attempted to investigate whether EFL teachers' job satisfaction can influence their professional development. SEM analysis in standardized estimates showed that although the effect reaches statistical significance, it does not have a remarkable effect size. Therefore, it can be stated that although job satisfaction has affected professional development, this effect has been very low (.05). According to the achieved results, it can be claimed that EFL teachers who are satisfied with their job, to some extent, have professional development. As pointed out by SEM analysis, job satisfaction affected one of the sub-scales of the professional development namely, "reflective activities" (.47). Then, after using multiple regression analysis, the results showed that job satisfaction weakly predicted professional development (B=.28, t=3.23, p-value=.01). According to the mentioned results, EFL teachers' job satisfaction has affected their professional development, but it has to be noted that this effect has been negligible. The findings of the current research are in parallel with Hollyene (2007), who conducted a research to find out the Predictors of Teachers' Job Satisfaction in Urban Middle Schools in North Carolina. The results concluded that teachers' main concerns about job satisfaction were revolved around the issues such as facilities, time, and resources, and to some extent around the professional development. On the basis of the findings of Hollyene and the present research, one can infer that teachers who are satisfied with their job are more likely to reflect on the strengths and weaknesses of their teaching. These teachers are more likely to attempt to improve their strengths and desire for more collaborative activities to discuss these strengths and weaknesses with their colleagues and try to improve their professional development. According to the results, teachers who are satisfied with their jobs tend to keep themselves professionally updated by reading newly available materials (e.g. through websites of publishers or brochures or visits of exhibitions on teaching materials), promising practices and educational reforms (e.g. via Internet, television, newspapers), scientific literature and professional journals.

The third research question intended to examine the effect of EFL teachers' reflective thinking on their professional development. Despite the previous research results and predictions that the EFL teachers ' reflective thinking would affect their professional development, the findings of the current study revealed that this effect could only be -.08. Hence, from the results of this research it can be claimed that not only reflective thinking has not affected professional development but also it has been affected by professional development. According to these results, it can be stated that EFL teachers with a high degree of professional development have a high reflective thinking and not the reverse. As showed by structural equation modeling in standardized estimates, reflective thinking affected one of the sub-scales of the professional development namely, "collaborative activities" (-.29) whereas professional development affected two sub-scales of reflective thinking namely, "reflection on self-efficacy" (.13) and "awareness of how one learns" (.26). The correlation matrix of latent variables and their sub-scales also shows that the lowest correlation of this study belongs to relationship between "awareness of how one learns"- as one of the sub-scales of reflective thinking- and professional development (-.06). In addition, multiple regression analysis confirmed the achieved results and revealed that EFL teachers' reflective thinking has failed to predict their professional development (B=.04, t=.711, p-value=.478). The research findings are in contrast to the findings obtained by some previous researches. For example, Wildman et al. (1990) claimed that professional development may not to occur without systematic reflection and then argued that there is general agreement that reflection results in professional development. In another study, Nunan and Lamb (1996) stated that reflective teaching of the instructors is considered as a procedure that can contribute learning and teaching and play a pivotal role in teachers' professional development. Looking at the findings, it can be supposed that teachers who have a higher level of reflective thinking are interested in keeping themselves professionally updated by teaching materials subject matter and studying exercise books and, including manuals. This idea received further support by Mirzaei, Aliah Phang, and Kashefi (2014), who argued that utilizing reflective thinking tools is an important way to improve teachers' reflective thinking skills. So, teachers can use these tools in teaching processes to support their reflective thinking skills. Furthermore, unlike some previous studies, teachers with a higher degree of reflective thinking do not cooperate with other teachers and colleagues, and focus more on individual activities rather than collective and collaborative activities. They don't talk about teaching problems with colleagues and don't share learning experiences with other colleagues.

The fourth research question was about the statistical association between EFL teachers' self-efficacy and their job satisfaction. As it is represented clearly in correlation matrix of latent variables and their sub-scales, there is a rather high positive and significant correlation between self-efficacy and job satisfaction (r=.64). Furthermore, not only these two latent variables but also all their sub-scales are strongly related to each other. On the other hand, SEM standardized estimates revealed that self-efficacy has higher association with job satisfaction (.76). In other words, teachers with higher self-efficacy are expected to be more satisfied with their job. The results of the

present study are in contrast to the results obtained by some previous researches. For instance, Demirdag (2015) in a study indicated that there is non-significant and negative correlation between teacher self-efficacy and job satisfaction. On the other hand, there are more previously conducted studies that confirmed the results of the present research (e.g. Errhouni, 2017; Karabiyik and Korumaz, 2014; MirSami and Ebrahimi Ghavam, 2007; Türkoğlu, Cansoy and Parlar, 2017). Errhouni (2017) stated that self-efficacy has a positive relationship with job satisfaction. This indicated the importance of self-efficacy for increasing job satisfaction. In another study, Karabiyik and Korumaz (2014) argued that there is a positive and significant relationship between teachers' self-efficacy perceptions and job satisfaction level. In a similar report, MirSami and Ebrahimi Ghavam (2007) pointed out that people with higher level of self-efficacy have more job satisfaction. They also claimed that self-efficacy can also increase ability of people to do things and make people more resistant to job stress. In another similar study, Türkoğlu, Cansoy and Parlar (2017) stated that teachers' self-efficacy correlated positively with job satisfaction. These results indicated that when teachers' perceptions of self-efficacy increase, their job satisfaction will also increase. According to the results of this study and above mentioned researches and considering that the highest association was between teachers' self-efficacy and job satisfaction, it can be assumed that teachers with high job satisfaction are more effective in classroom management and can control disruptive behavior in the class. The teachers with high job satisfaction employ better instructional strategies in comparison with other teachers. They employ different kinds of implement alternative strategies and assessment strategies in the classroom to create appropriate challenges for very capable students. The teachers are also more successful in managing the students so that they can motivate students who show low interest in school work. These teachers can respond to difficult questions of students and establish routines to keep activities running smoothly.

The fifth research question aimed to find the statistical relationship between EFL teachers' self-efficacy and their reflective thinking. The correlation matrix of all latent variables and their sub-scales showed a statistically significant and positive association between EFL teachers' self-efficacy and their reflective thinking (.58). Also, findings of the structural equation modeling in standardized estimates confirmed the results of correlation matrix in which there was a high correlation between EFL teachers' self-efficacy and their reflective thinking (.72). In addition, not only these two latent variables are strongly correlated with each other, but all of their sub-scales are associated with one another. So, it would be wise to assume that teachers with the high degree of self-efficacy would exercise more reflection on their professional career. The findings of the current research are in parallel with the results obtained from some of the studies (e.g. Babaei and Abednia, 2016; Baleghizadeh and Javidanmehr, 2015; Choy, Yim and Tan, 2017; Noormohammadi, 2014; Rahimi and Weisi, 2018). In the first study, Babaei and Abednia (2016) stated that there is a significant positive association between the factors of teachers' self-efficacy and reflectiveness. The results determined Efficacy for Learner Engagement as the only predictor of teacher reflectiveness and Meta-Cognitive Reflection as the only predictor of teacher self-efficacy. Using Structural Equation Modeling, most of the sub-scales of both variables were significantly correlated. In the second related study, Baleghizadeh and Javidanmehr (2015) showed the predictive power of reflectivity and its sub-scales on teachers' self-efficacy. They also showed the correlation between these two components. Moreover, *ethical and critical issues* from sub-categories of reflectivity had the highest contribution in this prediction. In the third study, Choy, Yim and Tan (2017), using structural equation modeling, investigated a reflective thinking model among teachers in Malaysia; the results revealed that higher degrees of reflective thinking can lead to teachers' higher self-efficacy. These teachers take their past performance into consideration and integrate it with what they are doing in the present to help them better prepare for the future. In the fourth study, Noormohammadi (2014) argued that there was a significant positive association between teachers' self-efficacy and reflective practice; also self-efficacy had positive association with reflection elements. According to the results, reflection increases job satisfaction and assists teachers to improve their confidence and independence in determining the policy of school or institutes. In the last and fifth study, Rahimi and Weisi (2018) indicated that there were significant positive relationships between self-efficacy and reflective practice. These results also showed that self-efficacy positively correlated with all sub-scales of reflective practice. Moreover, reflective practice positively correlated with all sub-scales of self-efficacy. According to the results of the present study and above mentioned studies, it could also be assumed that teachers with the high degree of reflective thinking could establish a better classroom management, gauge students' understanding of what they have taught and provide appropriate challenges for more capable students.

The last and sixth research question targeted the statistical association between EFL teachers'job satisfaction and their reflective thinking. According to the findings of correlation matrix of all latent variables and their sub-scales, EFL teachers'job satisfaction is positively correlated with their reflective thinking. Further, the achieved results of the correlation matrix are confirmed by the structural equation modeling in standardized estimates (r=.45). Although the number obtained for the association between job satisfaction and reflective thinking has been the lowest in this study, it can still be claimed that this relationship is positive and statistically significant. It means that teachers who are satisfied with their job are more likely to enjoy higher degrees of reflective thinking. As reported by structural equation modeling in standardized estimates, job satisfaction affected one of the sub-scales of the reflective thinking namely, "reflection on self-efficacy" (.33). One possible reason for these findings could be that those teachers, who are satisfied with their job, tend to develop lifelong learning skills more than unsatisfied teachers. It could also be assumed that these teachers try to reflect on what they do during their lessons so that this can enrich the strategies they use with new and more effective ones. On the other hand, satisfied teachers prefer to follow orders rather than being innovative because they don't want to get in trouble

and try to look for areas of connectivity between what and how they teach with their life experiences. According to the results, those teachers who are more satisfied with their job always assess the strengths and weaknesses of their teaching and have a higher degree of self-assessment and self-efficacy. These findings are in contrast with the results of Bilač and Miljković (2017), whose findings did not represent any effect for reflective practice on job satisfaction of lower elementary and subject teachers.

CONCLUSIONS AND IMPLICATIONS

Effective teachers have a pivotal role in the performance and success of educational systems and different psychological and sociological factors can influence their success and failure. For this reason, the present research intended to investigate four important factors influencing the performance of EFL teachers. More specifically, it aimed to investigate the interaction and relationship between three determining aspects of EFL teachers' behavior, namely self-efficacy, job satisfaction and reflective thinking and their influence on professional development. Two-hundred and twelve Iranian EFL teachers from different universities, schools, and language institutes participated in the research. As the main data collection instruments, four questionnaires were submitted to the participants in three different ways: email, social networks and in person and they were requested to complete and send them back. Structural Equation Modeling on SPSS AMOS version 24 was employed to examine the hypothesized model of relationships. The present research has two phases; the first part is related to the effect of EFL teachers'self-efficacy, job satisfaction and reflective thinking on their professional development, and the second part concerned the association between EFL teachers'self-efficacy, job satisfaction and reflective thinking. The conclusion, accordingly, is divided into two sections touched upon below.

Concerning the first phase, the results showed self-efficacy has the highest impact on professional development as compared to two other variables, namely job satisfaction and reflective thinking. Put differently, self-efficacy predicted professional development more strongly than job satisfaction and reflective thinking. As a result, it could be assumed that teachers with the high degree of self-efficacy have higher professional development.

The findings of the current study also showed that although in the hypothesized model of the study, it was predicted that job satisfaction can affect their professional development, the findings suggested that this effect can be extremely low. This means that EFL teachers satisfied with their job are more likely to slightly enjoy professional development.

It was also found that job satisfaction has an impact on "reflective activities", as a sub-scale of professional development. So, it can be concluded that job satisfaction of EFL teachers can influence their professional development though in a very small scale.

Also, regarding the findings, not only has reflective thinking not affected professional development, but reversely was affected by it. Therefore, it can be argued that teachers with the high degree of professional development have higher reflective thinking and not necessarily the other way round.

In the case of second part of the conclusion, which is related to the association between EFL teachers' self-efficacy, job satisfaction and reflective thinking, the results revealed that there is a positive and significant association between Iranian EFL teachers' self-efficacy, job satisfaction and reflective thinking. These results highlighted the significant role these variables play in the professional development of the teachers. Put differently, to develop teachers' self-efficacy, it is necessary, to take their job satisfaction and reflective thinking into account and vice versa.

Any language teaching investors or stakeholders, such as educational policy makers, teachers, and researchers might benefit from the findings of this research. Moreover, this study can help educators and administrators to better understand the psychological and sociological aspects of EFL teachers and take measures to remove barriers in this regard and foster the achievement of educational objectives.

As suggestions for future research subsequent studies may be thought of to consider additional latent variables to enrich the results of the present study. Future studies may revise the model'sendogenous variable selection and then examine how self-efficacy, job satisfaction, reflective thinking and professional development might affect these endogenous variables. Also, it would be desirable to continuously study the model results and model fit using the structural equation modeling approach with different groups of teachers. For example, model testing will be useful with teachers of different disciplines or in different fields of studies. Further studies may also replicate the comparison process of this study under different conditions such as teachers of different majors and in different behavioral fields. Such comparisons can add new insights to the development of the EFL teachers.

REFERENCES

Ashraf H. and Kafi Z. H. (2017) 'Philosophy of Education Sub-scales: Predictors of EFL Teachers' Professional Development', *i-manager's Journal on English Language Teaching*, Vol. 71, No. 1, pp. 11-18. https://doi.org/10.26634/jelt.7.1.11403

Babaei M., and Abednia A. (2016) 'Reflective Teaching and Self-Efficacy Beliefs: Exploring Relationships in the Context of Teaching EFL in Iran', *Australian Journal of Teacher Education*, Vol. 41, No. 9, pp. 1-27. https://doi.org/10.14221/ajte.2016v41n9.1

Baleghizadeh S., and Javidanmehr Z. (2015) 'Exploring EFL Teachers' Reflectivity and their Sense of Self-efficacy', *e-International Journal of Educational Research*. Vol. 5, No. 3. pp. 19-38. https://doi.org/10.19160/e-ijer.57660

Bandura A. (1977) 'Self-efficacy: Toward a unifying theory of behavioral change', *Psychological Review*, Vol. 84, No. 2, pp. 191-215. https://doi.org/10.1037/0033-295X.84.2.191

Bandura A. (2006) 'Guide for Constructing Self-Efficacy Scales', in:

T. Urdan and F. Pajares (eds) *Self-Efficacy Beliefs of Adolescents*. Greenwich: Age Information Publishing, pp. 307-337.

Bandura A. (2008) 'Toward an Agentic Theory of the Self', in H. Marsh, R. G. Craven, and D. M. McInerney (eds.) *Advances in Self-research, Self-processes, learning, and enabling human potential*. Charlotte, NC: Information Age Publishing, pp. 15-49.

Berman P., McLaughlin M.W., Bass-Golod G. V., Pauly E., and Zellman G. L. (1977*) Federal programs supporting educational change. Vol. VII: Factors Affecting Implementation and Continuation*, [online], Available: http://www.rand.org/pubs/reports/R1589z7.html [2014 Jun 9].

Bhat A. A. (2018) 'Job Satisfaction among High School Teachers'. *The International Journal of Indian Psychology.* Vol. 6, No. 1. https://doi.org/10.25215/0601.027

Bilač S., and Miljković D. (2017) 'Reflective Practice and Job Satisfaction in Classroom Management and Discipline', *Croatian Journal of Education*. Vol. 19, No. 3, pp. 13-27. https://doi.org/10.15516/cje.v19i0.2698

Brosh H. (1996) 'Perceived characteristics of the effective language teacher', *Foreign Language Annals*, Vol. 29, No. 2, pp. 125-138. http://dx.doi.org/10.1111/j.1944-9720.1996.tb02322.x

Choy S. Ch. and Oo P. C. (2012) 'Reflective thinking and teaching practices: a precursor for incorporating critical thinking into the classroom?', *International Journal of Instruction,* Vol. 5, No. 1, pp. 167-182.

Choy S. Ch., Yim J. S., and Tan P. L. (2017) 'Reflective Thinking Among Pre-service Teachers: A Malaysian Perspective', *Issues in Educational Research,* Vol. 27, No. 2, pp. 234-251.

Chýlová H., and Natovová L. (2013) 'Stress, Self-efficacy and Well-being of the University Students', *Journal on Efficiency and Responsibility in Education and Science*, Vol. 6, No. 3, pp. 190-202. http://dx.doi.org/10.7160/eriesj.2013.060306

Day C. (1999) *Developing Teachers: The Challenges of Lifelong Learning*. London: Taylor & Francis.

De Vries S., Jansen E.P.W.A., and Van de Grift W.J.C.M. (2013) 'Profiling teachers' continuing professional development and the relation with their beliefs about learning and teaching'. *Teaching and Teacher Education*, Vol. 33, pp. 78-89. http://dx.doi.org/10.1016/j.tate.2013.02.006

Demirdag S. (2015) 'Assessing Teacher Self-Efficacy and Job Satisfaction: Middle School Teachers', *Journal of Educational and Instructional Studies in the World*, Vol. 5, No. 5, pp. 35-43. http://dx.doi.org/10.13140/RG.2.1.2359.5364

Errhouni H. (2017) 'Mental health, self-efficacy and job satisfaction', *Scholarly Research Journal for Humanity Science & English Language*, Vol. 4, No. 22, pp. 5410-5414.

Harnett J. (2012) 'Reducing Discrepancies between Teachers Espoused Theories and Theories in Use: An Action Research Model of Reflective Professional Development', *Educational Action Research*, Vol. 20, No. 3, pp. 367-384. http://dx.doi.org/10.1080/09650792.2012.697397

Hollyene C. T. (2007) *Predictors of Teachers' Job Satisfaction in Urban Middle Schools* [Ph.D. Thesis, Online], University of North Carolina, Chapel Hill, Available: https://pdfs.semanticscholar.org/4f2f/5c007bcaa728ed17da11ed42a02814e62852.pdf [15 Apr 2019].

Hoyle R. H., and Panter A. T. (1995) 'Writing about Structural Equation Models'. In R. H. Hoyle (ed.) *Structural equation modeling: Concepts, issues, and applications*. Thousand Oaks, CA: Sage, pp. 158-176.

Jöreskog K. G., and Sörbom D. (1996) *LISREL 8: User's reference guide*. Chicago: Scientific Software International.

Karabiyik B. and Korumaz M. (2014) 'Relationship between Teachers' Self-Efficacy Perceptions and Job Satisfaction Level', *Procedia-Social and Behavioral Sciences*. Vol. 116, pp. 826-830. http://dx.doi.org/10.1016/j.sbspro.2014.01.305

Koehler J. R. (2006) 'The Measurement of Teacher Efficacy', A Poster Presented at the Harvard Graduate School of Education Student Research Conference and International Forum; Department of Education. Harvard Graduate School of Education. Cambridge, United States, Available: http://www.gse.harvard.edu/news-impact/tag/student-research-conference/ [9 Jun 2014].

Köseoğlu Y. (2015) 'Self-Efficacy and Academic Achievement – A Case From Turkey', *Journal of Education and Practice*, Vol. 6, No. 29, pp. 131-141.

Kyndt E., Gijbels D., Grosemans I., and Donche V. (2016) 'Teachers' everyday professional development mapping informal learning activities, antecedents, and learning outcomes', *Review of Educational Research*, Vol. 86, pp. 1111-1150. http://dx.doi.org/10.3102/0034654315627864

Landsman M. J. (2001) 'Commitment in public child welfare', *The Social Service Review*, Vol. 75, No. 3, pp. 386-419.

Larrivee B., and Cooper J. M. (2006) *An educator's guide to teacher reflection*, Boston : Houghton Mifflin.

Lu M., Loyalka P., Shi Y., Chang F., Liu C., and Rozelle S. (2017) 'The Impact of Teacher Professional Development Programs on Student Achievement in Rural China', *Stanford Center for International Development*, Working paper No. 600.

Majidinia G. (2018) 'The Relationship between Iranian EFL Teachers' Professional Development and Their Emotional Intelligence', *Journal of Applied Linguistics and Language Research*, Vol. 5, No. 3, pp. 67-80.

Malmir A. and Mohammadi, P. (2018) 'Teachers' Reflective Teaching and Self-Efficacy as Predicators of their Professional Success: A Case of Iranian EFL Teachers', *Research in English Language Pedagogy*, Vol. 6, No. 1, pp. 117-138. https://doi.org/10.30486/relp.2018.538818

Marcelo C. (2009) 'Professional Development of Teachers: Past and Future', *Sísifo. Educational Sciences Journal,* Vol. 8, pp. 5-20.

Meral M., Colak E., and Zereyak E. (2012) 'The Relationship between Self-Efficacy and Academic Performance', *Procedia - Social and Behavioral Sciences*, Vol. 46, pp. 1143-1146. https://doi.org/10.1016/j.sbspro.2012.05.264

MirSami M. and Ebrahimi Ghavam S. (2007) 'A Study on the relationship between self-efficiency, Social support and exam anxiety and the psychological health of the Men and Women Students in Allameh Tabatabaei University', *Quarterly Educational Psychology*, Vol. 2, No. 7, pp. 73-92.

Mirzaei F., Aliah Phang F., and Kashefi H. (2014) 'Assessing and Improving Reflective Thinking of Experienced and Inexperienced Teachers', *Procedia-Social and Behavioral Sciences*, Vol. 141, pp. 633-639. https://doi.org/10.1016/j.sbspro.2014.05.111

Mostofi A., and Mohseni A. (2018) 'The Effect of Class Management Types (Authoritative, Democratic, Laissez-faire) on Teacher Professional Development among Iranian EFL Teachers', *Journal of Applied Linguistics and Language Research*, Vol. 5, No. 5, pp. 248-265.

Muhammed Amanulla A. K., and Aruna P. K. (2014) 'Effect of Teacher Efficacy on Professional Development of Higher Secondary School Teachers of Kerala', *IOSR Journal of Humanities and Social Science*, Vol. 19, pp. 37-41. https://doi.org/10.9790/0837-19633741

Natovová L. and Chýlová H. (2014) 'Is There a relationship between Self-efficacy, Well-being and Behavioral Markers in Managing Stress at University Students', *Journal on Efficiency and Responsibility in Education and Science,* Vol. 7, No. 1, pp. 14-18. https://doi.org/10.7160/eriesj.2014.070103

Noormohammadi S. (2014) 'Teacher Reflection and its Relation to Teacher Efficacy and Autonomy', *Procedia-Social and Behavioral Sciences*, Vol. 98, pp. 1380-1389. https://doi.org/10.1016/j.sbspro.2014.03.556

Novozhenina A., and López Pinzón M. M. (2018) 'Impact of a professional development program on EFL teachers' performance', *HOW Journal*, Vol. 25, No. 2, pp. 113-128. https://doi.org/10.19183/how.25.2.406

Nunan D. and Lamb C. (1996) *The Self-Directed Teacher: Managing the Learning Process*, Cambridge: Cambridge University Press.

Posner G. J. (1985) *Field Experience: A Guide to Reflective Teaching*, New York: Longman.

Rahimi M., and Weisi H. (2018) 'Reflective practice, self-efficacy and research practice of EFL teachers: Examining possible relationships', *Issues in Educational Research*, Vol. 28, No. 3, pp. 756-780.

Rahman U., Wan Sulaiman W., Nasir R. and Omar F. (2014) 'The Role of Job Satisfaction as Mediator in the Relationship between Self-Efficacy and Organizational Citizenship Behavior among Indonesian Teachers', *International Journal of Business and Social Science*, Vol. 5, No. 9, pp. 257-260.

Rots I., Aelterman A., Vlerick P. and Vermeulen K. (2007) 'Teacher education, graduates' teaching commitment and entrance into the teaching profession'. *Teaching and Teacher Education*, Vol. 23, pp. 543-556.

Seashore S. E. and Taber T. D. (1975) 'Job Satisfaction Indicators and Their Correlates', *American Behavioral Scientist*, Vol. 18, No. 3, pp. 333-368. https://doi.org/10.1177/000276427501800303

Suchánková E., Hrbáčková K. (2017) 'Mentoring in the Professional Development of Primary and Secondary School Teachers', *Journal on Efficiency and Responsibility in Education and Science*, Vol. 10, No. 1, pp. 7-15. https://doi.org/10.7160/eriesj.2017.100102

Tschannen-Moran M., and Woolfolk Hoy A. (2001) 'Teacher efficacy: Capturing an elusive construct'. *Teacher Education and Practice,* Vol. 17, No. 3, pp. 783-805. http://dx.doi.org/10.1016/S0742-051X(01)00036-1

Türkoğlu M., Cansoy R., and Parlar H. (2017) 'Examining Relationship between Teachers' Self-efficacy and Job Satisfaction', *Universal Journal of Educational Research*, Vol. 5, No. 5 pp. 765-772. http://dx.doi.org/10.13189/ujer.2017.050509

Underhill A. (1986) *The Teacher Development Series, Part1*, Oxford: Heinemann.

Uştuk Ö., Çomoğlu İ. (2019) 'Lesson Study for professional development of English language teachers: Key takeaways from international practices', *Journal on Efficiency and Responsibility in Education and Science*, Vol. 12, No. 2, pp. 41-50. http://dx.doi.org/10.7160/eriesj.2019.120202

Weiss R., Dawis G., England G., and Lofquist L. (1967) 'Manual for the Minnesota Satisfaction Questionnaire', *Minnesota studies in vocational rehabilitation*, Vol. 22.

Wildman T. M., Niles J. A., Magliaro S. G. and McLaughlin R. A. (1990) 'Promoting reflective practice among beginning and experienced teachers', In Clift, R. T., Houston, W. R. and Pugach, M. C. (eds.), *Encouraging Reflective Practice in Education*. New York: Teachers College Press, pp. 139-162.

Zalipour A. (2015) *Reflective practice*, [Online], Available: https://www.waikato.ac.nz/data/assets/pdf_file/0006/360861/Reflective-Practice-June 2015.pdf [23 Jun 2019]

Full research paper

DOES SERVICE QUALITY IN EDUCATION AND TRAINING PROCESS MATTERS? STUDY OF GOVERNMENT'S HUMAN RESOURCE AGENCIES IN INDONESIA

Hety Budiyanti[1]✉
Shine Pintor Siolemba Patiro[2]
Muhammad Djajadi[3]
Sri Astuty[1]

[1] Faculty of Economics, State University of Makassar, Indonesia

[2] Universitas Terbuka, Indonesia

[3] Faculty of Teacher Training and Education, Universitas Muhammadiyah Makassar, Indonesia

✉ hetyvirgo89@gmail.com

ABSTRACT

This study aims to investigate the application of service quality theory to explain and predict the satisfaction, trust, and motivation of participants at leadership education and training programs of echelon 3 and 4 held by Human Resource Development Board Province in Indonesia. This study uses purposive sampling and survey methods to generate sampling, which consists of 480 respondents from some of the main provinces in Indonesia. The data are analyzed using Variance Based Structural Equation Modeling - Partial Least Square due to the existence of formative indicators for service quality. The result shows that five dimensions of service quality have a positive and significant effect on participants' satisfaction, which, in turn, impacts their trust and motivation. Responsiveness is one of service quality dimensions with the greatest influence on participants' satisfaction. Data collected in this study are limited to the context of leadership education and training programs of echelon 3 and 4. Thus, further research may involve other education and training programs. The results of this study may serve as a guideline for other education and training providers in other provinces or places of Indonesia to increase their service quality, which will impact satisfaction, trust, and motivation of participants.

KEYWORDS

Government employees, motivation, satisfaction, service quality, training, trust

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Highlights

- *The service quality model is used to predict satisfaction, trust, and motivation of participants at leadership education and training programs of echelons 3 and 4.*
- *The data are analyzed using Variance Based SEM (SEM-PLS) due to the existence of formative indicators for service quality.*
- *5 dimensions of service quality have a positive and significant effect on participants' satisfaction, which, in turn, impacts their trust and motivation.*
- *Responsiveness has the greatest influence on participants' satisfaction.*
- *Service quality has an indirect influence on motivation through satisfaction.*

INTRODUCTION

Indonesia's government regulate education and training for officers in civil state apparatus/government employees (CSA) with Code of Rule Head of State Administration Agency, Number 19, year 2015 (LAN, 2015a) which regulates leadership education and training programs for echelon 3 and PERKALAN 20 year 2015 for leadership education and training programs of echelon 4 (echelon 4 is a lower rank officers than echelon 3) (LAN, 2015b). These codes of rules are set with specific objectives. Leadership education and training programs of echelon 3 aims to form high-ability officers in leading structural and functional CSAs with lower

rank, including other stakeholders to increase their motivation in optimizing the use of resources in order to accomplish the state province's vision, along with building synergies between ministries, institutions, and provinces in handling various strategic national issues (LAN, 2015a). While, leadership education and training programs of echelon 4 aim to improve operational leadership competencies including the ability to initiate planning of agency activities, influence and mobilize subordinates and strategic stakeholders to execute planned activities (LAN, 2015b). As a requirement to advance in their career and acquired strategic offices and positions in government organizations, CSAs have to complete education and training of echelon 3 and echelon 4.

Based on the explanation above, these required competencies of echelon 3 and echelon 4 structural officers are crucial. With the increasing demand on these competencies for structural officers in central or regional government institutions/ agencies, the existence of Human Resource Development Board Province (HRDBP) as a province government institution mandated to execute education and training for CSAs is considered to be critical (Budiyanti, Patiro, and Nurman, 2018). This mandate required HRDBP to manage a satisfactory education and training programs for CSAs in every province or region of Indonesia to establish an adequate CSAs well suited for their tasks and position in every government office in the country.

The central government obligates every HRDBP in Indonesia to be accredited by The National Institute of Public Administration (NIPA), which is given every four years. This accreditation will decide types of education and training programs allow to be held by each HRDBP in Indonesia. The higher the accreditation score for HRDBP, the more type of education and training programs are allowed to be held by the HRDBP. For example, HRDBP with A grade accreditation allows to held leadership education and training programs for echelon 2, while HRDBP with B grade accreditation only allows organizing leadership education and training programs for maximum echelon 3 level (echelon 2 level is higher than echelon 3 level). One of the valuation items in accreditation is service quality provided by HRDBP. Service quality is considered to be an essential element as the government has decided to regulate it with a specific code of law, PERKALAN no. 25 the year 2015, where the quality of education and training process in a government institution is guarantee.

Thus, HRDBP in every province, as one of the education, training and development organizations of CSAs, need to maintain and improve their quality of service not only for accreditation purpose but also due to the competition between other education, training, and development of government agencies. This competition arises from the selection right of participants regarding education and training institutions as a service provider (such as NIPA, which is a national agency for education and training of CSAs or HRDBP in other provinces) to complete their education and training program. However, despite the importance of service quality for HRDBP, based on our preliminary study in HRDBP South Sulawesi and Central Sulawesi provinces, services quality provided was under expectations and numbers of complaints from leadership training for echelon 3 and echelon 4 participants during the learning process were arising.

Based on records on numbers of complaints in education and training programs held at HRDBP of South and Central Sulawesi, it has shown arise in approximately around 2.3% from the year 2013 until 2018. This phenomenon is also confirmed by the initial interviews with 100 participants of leadership training for echelon 3 and 4, where 65 respondents expressed their dissatisfaction with the services provided by HRDBP, 35 respondents expressed satisfaction, while three others were abstained. In general, respondents are complaining about the facilitator's qualities, study and building facilities, and food qualities, among other things. These records and interviews transcript indicate that leadership education and training participants of echelon 3 and echelon 4 were not satisfied with services quality provided by HRDBP of Central Sulawesi and South Sulawesi province during the educational and training process. Therefore, it will affect the satisfaction of leadership training participants of echelon 3 and 4, which will impact their trust and motivation.

The first gap of this study is closely related to the concept of service quality. Over the past few decades, the quality of service has become a major concern for practitioners and researchers since service quality have a strong influence on business performance, lower operational costs, customer satisfaction, customer loyalty, and profitability (Singh and Khanduja, 2010). One of the popular model in service quality and often used in various research in the field of service is the Service Quality (SERVQUAL) model proposed by Parasuraman, Zeithaml, and Berry (1985) in their research (Kassim and Abdullah, 2010; Saleem, Zahra, and Yaseen, 2017; Kloutsiniotis and Mihail, 2018). However, this model has several limitations, especially in terms of its use for service providers in the education sector as stated by Hsiao and Lin (2008) and Ramseook-Munhurrun, Lukea-bhiwajee and Naidoo (2010).

Throughout time, the SERVQUAL model has been widely adopted in assessing the quality of services in the field of education (Ramseook-Munhurrun, Lukea-bhiwajee and Naidoo, 2010). These researchers employed the modified SERVQUAL model, which adjusted to the context of educational services in finding the effect of service quality on student satisfaction.

Based on the literature review from previous studies (for example: Cuthbert (1996); Pariseau and McDaniel (1997); McAdam and Welsh (2000); Chua, (2004); Davies, Douglas and Douglas (2007); Oliveira and Ferreira (2009)) regarding implementation of service quality in education sector, dimensions measurement employed for service quality deliver different and inconsistent results, also none of these studies were conducted in the context of training and education for government employees. In line with a study conducted by Leonnard (2018) on the application of SERVQUAL dimension in explaining and predicting the satisfactions of university students in Indonesia, this study focuses on the application of the service quality model of Parasuraman, Zeithaml and Berry (1985) in the education and training for government employees conducted by HRDBP, especially leadership

education and training programs for echelon 3 and echelon 4. The second gap is related to the relationship between service quality and other variables, such as trust. Trust needs to be explored deeply regarding the relationship between service quality and customer satisfaction (Amorim and Saghezchi, 2014). In line with Amorim and Saghezchi (2014), several studies such as Laaksonen, Jarimo and Kulmata (2009), Kassim and Abdullah (2010), and Lien et al (2014) conclude that at full length, researches in the field of service quality rarely reveal the relationship of trust with customer satisfaction or customer loyalty. Furthermore, according to them, studies in the field of service quality are still lacking in revealing the relationship between SERVQUAL variables with customer trust, customer emotions, and customer moods.

Therefore, this study aims to acknowledge the relationship between service quality in training and education program of government employees with the trust of training participants, which is formed by their satisfaction. Several studies conducted in the field of education regarding service quality (such as: Oliveira and Ferreira (2009); Ramseook-Munhurrun, Lukea-bhiwajee and Naidoo (2010); Sharabi (2013); Sweis et al. (2016); Subrahmanyam (2017)) have failed to acknowledge the role of trust in the relationship between service quality and satisfaction. Thus, there is an urgency to observe such relations as trust is a crucial factor in shaping long-term relationships between service industries and customers (Kassim and Abdullah, 2010).

Concerning training motivation, the education and training field is different from other service fields. As a result of the fundamental relation of the education and training field with participant involvement in terms of cognition and needs. However, the services of education and training field, as well as education field in general, are different from other professional services due to its important role in the life of training participants who need considerable motivation and intellectual skills to achieve their goals (Gruber et al., 2010).

The motivation for training participants has an important role in achieving success during a sustainable education and training process. As stated by Stukalina (2010) that the education process is a cycle process where service quality provided by the education agency, as a service provider, will influence the motivation of participants during the education process, which will further improve the quality of the process. As for the process of education and training, service quality provided by the service provider will affect the motivation of education and training participants. Thus, the service quality of education institutions may influence motivation and intellectual skills of students in achieving their objectives (Gruber et al., 2010). Overall, this study accounts for participants' trust and participants' motivation as independent variables, which is formed by participants' satisfaction, whereas participants' satisfaction is shaped by the service quality of the education and training agency.

The third gap in this study concerns the use of indicators in measuring service quality dimensions. Based on the literature review, throughout time, constructs of service quality are treated as constructs with reflective indicators (O'Cass and Carlson, 2012). For example on studies, such as: Cronin and Taylor (1992) Parasuraman, Zeithaml and Berry (1994), Akbar and Parvez (2009), Ahmed et al. (2010), Kassim and Abdullah (2010), Butt and Aftab (2013), Subrahmanyam and Bellamkonda (2012, 2016); and Subrahmanyam, (2017). However, O'Cass and Carlson (2012) state that service quality constructs with formative indicators is highly superior. In line with their study, Collier and Bienstock (2009) also state that errors in the specification model of service quality must be carefully considered since service quality formed by constructs with both formative and reflective indicators would have different interpretations.

Based on the study conducted by Collier and Bienstock (2009), service quality formed by constructs with formative indicators has a greater significant effect on customer satisfaction compared to constructs with reflective indicators. Their study is also in line with Rabaa'i (2015) who finds evidence that service quality has a higher construct validity with formative indicators. Thus, in this study, the service quality of HRDBP is treated as constructs with formative indicators.

Therefore, the main purpose of this study is to investigate the application of service quality theory to explain and predict the satisfaction, trust, and motivation of participants (government employees) at leadership education and training programs of echelon 3 and 4 held by Human Resource Development Board Province (HRDBP) in Indonesia. The following sections in this paper will discuss the theoretical background, research method, result and analysis, and conclusion.

THEORETICAL BACKGROUND

Service quality in education and training agency

Service quality is a global assessment or attitude relating to a particular service, overall customer impression, or organizational advantage and services (Silvestri, Aquiliani, and Ruggieri, 2017). In delivering services, quality is an important element that must be examined in services, especially in the education and training field. Service quality is crucial as it has a direct impact on the image of the service provider itself (Lien et al., 2014).

Lien et al. (2014) and Silvestri, Aquiliani, and Ruggieri (2017) state that the dimensions of service quality are identified through a study by Parasuraman, Zeithaml and Berry (1985: 48) known as SERVQUAL (Service Quality), as follows:

1. Tangibles. The appearance, facilities, and physical infrastructure of the company and the condition of the surrounding environment is explicit evidence of the services provided by the service provider.
2. Reliability. The ability to provide services as promised, trusted, accurate, consistent, and in line with expectations.
3. Responsiveness. The readiness of employees in serving customers, speed in the transaction process, and handling customer complaints.
4. Assurance. The ability of employees to deliver confidence and trust in line with given promises to costumers.
5. Empathy. The willingness of employees and employers to give deep and exceptional attention to customers by understanding their needs and desires.

Many researchers (e.g., Cuthbert (1996); Pariseau and McDaniel (1997); McAdam and Welsh (2000); Chua, (2004); Davies, Douglas and Douglas (2007); and Oliveira and Ferreira (2009)) use SERVQUAL dimensions in assessing service quality in education. However, these studies provide different and inconsistent results. Subrahmanyam, Bellamkonda, and Mishra (2013) state that measuring service quality in the education field is a difficult task related to its unique dimensions and characteristics. This is confirmed by the existence of various literature written by various, researchers (e.g. Subrahmanyam and Bellamkonda, 2016; Oliveira and Ferreira, 2009;Blass and Weight, 2005; Cornuel, 2005; and Chua, 2004) who identify causes and consequences of service quality in the education field.

Based on these literatures, service quality indicators for education field are obtained as measured by students' perception. Thus, training participants, as the context of this study, act as customers and are largely influenced by the service quality of education and training agency. Hence, they are considered as essential customers by training providers (Abili et al., 2012).

Training participants satisfaction

According to Schiffman and Wisenblit (2015), satisfaction is the feeling of an individual pleasure or disappointment resulting from comparing the perceived performance of products or services with expectations. Whereas, Cronin and Taylor (1992) state that customer satisfaction is a post-purchase evaluation or results from evaluation after comparing perception with expectations (Kassim and Abdullah, 2010; Fatima and Razzaque, 2014; Saleem, Zahra, and Yaseen, 2017)

In the education field, the concept of participants' satisfaction has been discussed extensively. Students' satisfaction, as well as education and training participants' satisfaction, which is influenced by the quality of education providers have been investigated by various researchers, such as Silvestri, Aquiliani, and Ruggieri (2017) and Subrahmanyam, (2017). Moreover, Ahmed et al. (2010) find evidence that university service quality has a significant effect on student satisfaction. Therefore, there is an agreement among researchers that there is a causal relationship between the quality of education services and students' satisfaction (Silvestri, Aquiliani, and Ruggieri, 2017; Subrahmanyam, 2017). Thus, in the education and training field, education, and training participants' satisfaction is influenced by the quality of the education and training provider/agency.

Training participants trust

Some studies consider customer trust to be an important factor that plays a significant role in the success of delivering public services, for example, Fatima and Razzaque (2014); Kloutsiniotis and Mihail (2018) and Budiyanti, Yamin and Patiro, (2019). A thorough understanding on the concept of trust initiated by Parasuraman, Zeithaml and Berry (1985) is required, who view that customers must have trust in the organization/company.

Customers will feel safe in conducting transactions with the company where transactions are guaranteed with certainty. Therefore, the organization/company can meet customer needs if the concept of trust consists of reliability and integrity. Thus, trust plays an important role in the long-term relationships between customers and organizations/companies, especially involving customer trust regarding quality, reliability, and the integrity of services delivered by the company (Butt and Aftab, 2013; Lien et al., 2014).

Training participants motivation

Robbins and Judge (2015) state that motivation is a mental process that relates to intention, direction, and individual efforts in achieving their objectives. According to their study, there are popular motivational theories, such as Maslow's motivation theory proposed by Abraham Maslow based on five levels of human needs; x theory and y theory proposed by Douglas McGregor; the motivation-hygiene theory proposed by Frederick Herzberg; theory of the need for achievement proposed by David McClelland; and self-determination theory proposed by Deci et al. Generally, the concept of training participants' motivation is derived from these motivational theories. For example, studies conducted by Eccles and Wigfield (2002) and Meyer and Turner (2006) concluded that, according to the theory of the need for achievement, academic performance and achievements of students are significantly influenced by teaching quality, classroom environment, and students motivation, as well as emotional factors and cognition. Furthermore, according to these studies, students' motivation facilitates learning and improves their performance in the educational environment (Subrahmanyam, 2017).

In terms of education, the desire to develop self ability is constantly related to the training participants' motivation during the education and training process (Dermitzaki, Vavougios, and Kotsis, 2012; Di Serio, Ibáñez, and Kloos, 2013; Furió et al., 2015). According to these studies, the level of training participants' motivation illustrates their contribution and involvement in the learning environment. In line with this, Skinner and Belmont (1993) state that training participants who are active and highly motivated will automatically be involved directly in the learning process voluntarily. This finding also confirmed by Dermitzaki, Vavougios and Kotsis (2012) and Di Serio, Ibáñez, and Kloos (2013) who conclude that the learning point of view describes not only the change of attention towards cognition but also the motivation of training participants and factors underlying the achievement of effectiveness and usefulness of learning.

The relationship of service quality with education and training participants' satisfaction

Parasuraman, Zeithaml and Berry (1988) identify five dimensions of SERVQUAL, namely: tangibles, reliability, responsiveness, assurance, and empathy. These five aspects of service quality, when applied together, will build excellent quality and satisfying services, this result is in line with Lien et al. (2014) and Silvestri, Aquiliani, and Ruggieri (2017).

Moreover, Lovelock and Gummeson (2004) find evidence that service quality has a positive and significant influence on customer satisfaction. The maintenance of service quality may minimize the occurrence of customer dissatisfaction. Participants' satisfaction in leadership education and training for echelon 3 and 4 is determined through their perceptions of services acquired from education and training agency during the education and training process. Eventually, the level of satisfaction will direct participants of leadership training for echelon 3 and 4 to the overall perception of the service quality provided by HRDBP. Thus, hypotheses in this study are stated as follow:

- Hypothesis 1 (H1): Service quality of HRDBP from tangibles (physical evidence) aspect has a positive effect on the satisfaction of participants in leadership training of echelon 3 and 4.
- Hypothesis 2 (H2): Service quality of HRDBP from reliability (physical evidence) aspect has a positive effect on the satisfaction of participants in leadership training of echelon 3 and 4.
- Hypothesis 3 (H3): Service quality of HRDBP from responsiveness aspect has a positive effect on the satisfaction of participants in leadership training of echelon 3 and 4.
- Hypothesis 4 (H4): Service quality of HRDBP from empathy aspect has a positive effect on the satisfaction of participants in leadership training of echelon 3 and 4.
- Hypothesis 5 (H5): Service quality of HRDBP from assurance aspect has a positive effect on the satisfaction of participants in leadership training of echelon 3 and 4.

The effect of training participants ,satisfaction toward trust

Trust is defined as the formation of psychological intentions to accept risks based on the expectations of other people's intentions or behavior (Fatima and Razzaque, 2014; Kloutsiniotis and Mihail, 2018). Trust is a catalytic critical construct in transactional relationships. In various literature, especially in the marketing field, regarding the relationship between commitment and trust, trust has been conceptualized as something that arises when one party has confidence toward reliability and integrity of other parties (Farndale, Hope-Hailey and Kelliher, 2011; Alfes, Shantz, and Truss 2012).

Gwinner, Gremler, and Bitner (1998) found evidence that trust is the benefit of belief valued by customers in long-term exchange relationships with service providers/organizations. Thus, in this study, participants' trust of leadership training of echelon 3 and 4 towards HRDP will be well-conceived when they feel satisfied with its service quality. Therefore, the next hypothesis in this study is stated as follow:

- Hypothesis 6 (H6): Satisfaction of participants in leadership education and training of echelon 3 and 4 has a positive effect on trust toward HRDBP

The effect of training participant satisfaction toward motivation

A research conducted by Hufton, Elliot, and Illushin (2003) found evidence that integrated administrative processes and adequate academic relationships will increase students' motivation during the learning process. Education and training program is a long and continuous process as the factor quality of education and training agency is essential for trainees' participation to achieve success in education and training process. Participants of education and training program will try to fulfill their needs and satisfaction toward education and training agency, which in turn motivates them during the education and training process (Cook and Artino, 2016).

As argued by Wolfgang and Dowling (1981) that education agencies must be capable of identifying needs and motivations of their students and make appropriate adjustments to the service quality and administrative procedures. Furthermore, they also emphasized that poor service quality from lecturers, administrative staff, and other officers would discourage students, which will affect their success in the education process.

In the education field, Ahmed et al. (2010) explored the relationship between service quality, satisfaction, and motivation in universities using the SERVQUAL model. Their results show that the service quality of university has a significant effect on the satisfaction and motivation of students where the satisfaction of students will increase their motivation during the education process. Furthermore, Sobral (2004) also showed that motivation of medical students is significantly influenced by their perceptions of service quality of education provider (medical faculties) due to its value and meaning of experience during the educational process. He also found evidence that students' perceptions toward service quality of education providers will form their satisfaction, which impacts their motivation during their educational process. Therefore, the next hypothesis in this study is stated as follow:

- Hypothesis 7 (H7): Satisfaction of participants in leadership education and training of echelon 3 and 4 in HRDBP has a positive effect on motivation.

Thus, based on previous literature review and development of hypotheses, this research model is depicted in figure 1.

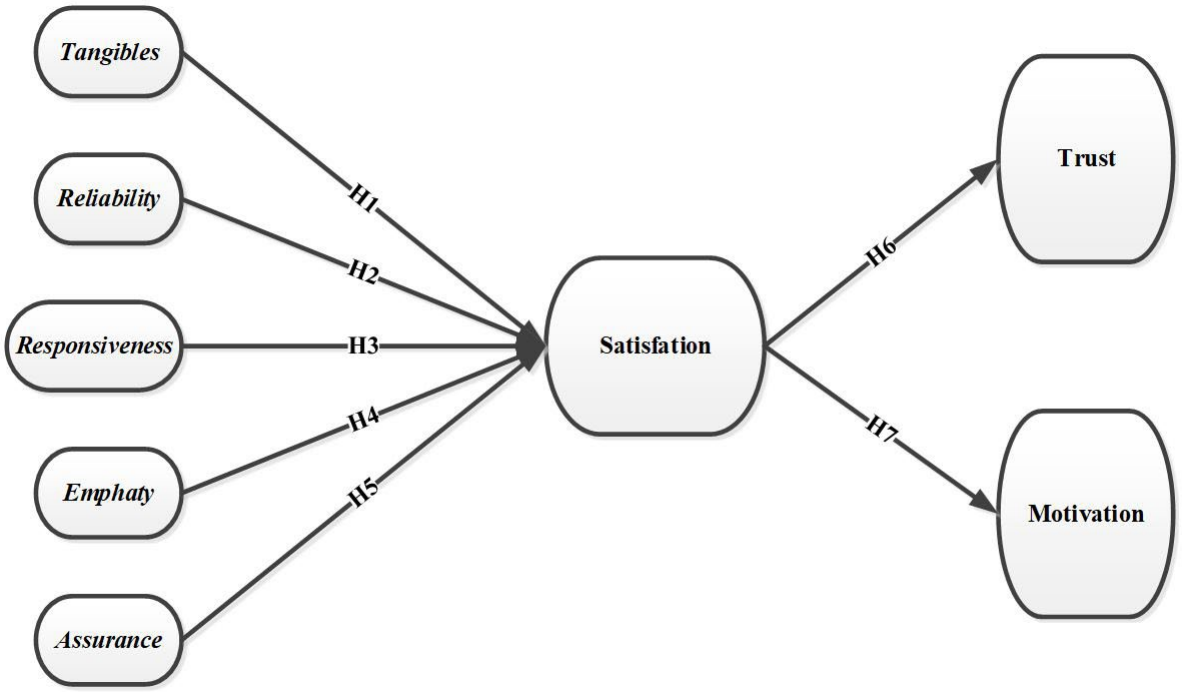

Figure 1: Research Model (by authors)

METHODS

This study consist of two stages conducted from March 2018 until September 2018. The first stage is an explanatory study aims to identify all indicators related to the perception of participants in education and training programs of echelon 3 and 4 regarding the quality of service provider. This step is necessary to discern their conformity with indicators of SERVQUAL dimension as proposed by Parasuraman, Zeithaml, and Berry (1985), along with their rate of satisfaction, trust, and motivation. Moreover, validity and reliability testing of indicators provided from the initial interview is also performed at the first stage. The following stage is conducted to reveal the relation between constructs in the study.

Stage one was conducted in March 2018 until May 2018 as a preliminary study aims to determine the accuracy of SERVQUAL dimensions by Parasuraman, Zeithaml and Berry (1985) when applied in the education and training field. For this purpose, trainees of HRDBP of Central and South Sulawesi were given inquiries regarding attributes of service quality necessarily inherent by training agency, as well as the level of their satisfaction, trust, and learning motivation. In this stage, an initial interview was conducted with 30 participants of leadership training of echelon 3 and 4 in HRDBP of Central and South Sulawesi regarding perceived service quality, satisfaction, trust, and motivation. Results of the interview in stage one are set as the basis for developing questionnaire items, which combined with measurement items of each construct developed by previous researchers. From questionnaire development in stage one, 32 indicators were acquired for 8 constructs used in this study.

Furthermore, questionnaires were sent back to 200 participants of leadership training of echelon 3 and 4 in HRDBP of Central and South Sulawesi. However, only 175 (response rate of 87.5%) questionnaires were returned with 120 completed feasible questionnaires to be analyzed. Results from these questionnaires were processed using SPSS program to perform Factor Analysis (FA). Based on the FA results, 3 of 32 indicators were removed due to their loading factor value was below 0.6. These indicators are indicator 1 (HRDBP always gives accurate information on time), and indicator 2 (HRDBP provides services in a timely matter) of reliability constructs, and indicator 1 (HRDBP can conduct a superior education and training program) of assurance constructs. Thus, there are 29 indicators to measure 8 constructs in this study. The eight constructs consist of education and training agency properties such as learning facilities, reliability, responsiveness, empathy, assurance, and education and training participant's properties such as satisfaction, trust, and motivation.

The second phase of this study involved sending questionnaires to all respondents, namely all participants of education and training leadership program of echelon 3 and 4 in HRDBP of several main provinces of Indonesia, such as, DKI Jakarta (the capital city of Indonesia), East Java, South Sulawesi, Central Sulawesi and North Sumatra. These provinces are chosen as sample studies since they represent the main islands in Indonesia region, which are Java, Sumatra, and Sulawesi.

The Sampling method of this study is non-probability sampling with a purposive sampling technique. The determination of sample size in this study is closely related to the use of Structural Equation Modeling (SEM) Partial Least Square (PLS) as data analysis. The main reason for using SEM-PLS is the existence of five constructs

with formative indicators, namely tangible, reliability, responsiveness, assurance, and empathy.

The minimum sample size when using PLS-SEM was 5-10 multiplied by the number of indicators (Gefen, Rigdon and Straub, 2011). As indicators in this study are 29 indicators, thus, the minimum sample size is 10 x 29 = 290. This study decides to use a sample size of 600 respondents. However, of 600 questionnaires distributed, only 510 were returned, and only 480 were feasible for further analysis. Thus the response rate in this study is 80%, which is within a minimum requirement for further analyzes (Neuman, 2014).

In this study, the construct of service quality was measured using indicators developed by Parasuraman, Zeithaml and Berry (1985; 1988) and have been used extensively by some writers, such as, Lien et al., (2014); Annamdevula Subrahmanyam (2017) and Silvestri, Aquiliani, and Ruggieri (2017). Constructs of satisfaction and trust in training participants were measured using indicators developed by Ribbink et al. (2004). The Construct of participants' motivation is measured using indicators developed by Zimmerman (2008). The construct measurement scale in this study uses a Likert scale, 1 to 5, 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; 5 = strongly agree.

Data analysis technique

Structural Equation Modeling (SEM) by Warp PLS 6 and SPSS software is applied as a data analysis technique. The data analysis method in this study applies SEM two-step approach, namely: the measurement model and the structural model proposed by Anderson and Gerbing (1988). Model testing determines from criteria of Goodness of Fit (GOF), according to Tenenhaus Amato and Espito Vinzi (2004) for variance-based SEM models.

RESULTS AND DISCUSSIONS

Measurement Model Testing (construct validity)

Table 1 (results of discriminant and convergence validity) demonstrates constructs of satisfaction, trust, and motivation (reflective indicators) with a satisfactory convergence validity where the value of AVE (Average Variance Extracted) exceeds 0.5 (Hair et al., 2010, 2011, 2012). While AVE value for constructs of service quality (tangible, reliability, responsiveness, empathy, and assurance), which are formative indicators are empty or no value, and this is very common for formative indicators. Moreover, table 1 shows that Cronbach alpha and composite reliability values of each reflective construct (satisfaction, trust, and motivation) exceed 0.7, so it can be stated that the three reflective constructs in this study are reliable (Hair et al., 2010, 2011, 2012).

Indicators use in this research are derived from SERVQUAL dimensions from Parasuraman, Zeitham, and Berry (1985) for formative constructs. For example, tangible indicators are related to the building and study facilities. Reliability indicators are how lecturers provide their service at the time they promise to do, and they perform service right the first time. Responsiveness indicators are how lecturers are never too busy to repond to the participants' reques, and lecturers give prompt service. Assurance indicators are how lecturers instill confidence in participants, and lecturers have the knowledge to answer participants' questions. Empathy indicators are how lecturers give personal attention to each participant, and lecturers understand participants' specific needs.

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While for reflective constructs such as satisfaction, trust and motivation, we use 4 indicators for each construct. For example, satisfaction indicators are how participants feel content and comfortable during the study process. Trust indicators are how lecturers have adequate proffesional qualification, and have the ability to serve participants well. Motivation indicators are how participants perceived to be well respected by their peers during the study process, and the programs will have direct influence on the improvement of participants' productivity.

In this study, the method of reliability test employ is composite reliability due to its superiority in estimating internal consistency (Hair et al., 2010, 2011, 2012). For formative constructs, results in Table 1 show that weight indicator value for indicators on each of five constructs (tangible, reliability, responsiveness, empathy, and assurance) is significant with p values <0.001 and $p<0.05$. Additionally, the Variance Inflation Factors (VIF) value of these constructs is under 3.3, which is in line with (Kock, 2013). Hence, all indicators in five formative constructs (tangible, reliability, responsiveness, empathy, and assurance) are adequate for the next stage, the structural model measurement stage.

Constructs (Cronbach Alpha)	Indicators	Loading Factor	Composite Reliability	AVE (Average Variance Extracted)	*p*-value	VIF
Tangible	T1	0.636			<0.001	1.255
	T2	0.673			<0.001	1.332
	T3	0.841			<0.001	1.908
	T4	0.814			<0.001	2.035
Reliability	REL3	0.755			<0.001	1.459
	REL4	0.755			<0.001	1.540
Responsiveness	RESP1	0.748			<0.001	1.970
	RESP2	0.827			<0.001	2.145
	RESP3	0.642			<0.001	1.357
	RESP4	0.661			<0.001	1.349
Assurance	ASS2	0.826			<0.001	1.394
	ASS3	0.805			<0.001	1.327
	ASS4	0.624			<0.001	1.312
Emphaty	EMP1	0.788			<0.001	2.053
	EMP2	0.775			<0.001	1.996
	EMP3	0.791			<0.001	2.004
	EMP4	0.817			<0.001	2.155
Satisfaction (0.917)	KEP1	0.601	0.795	0.594		
	KEP2	0.694				
	KEP3	0.798				
	KEP4	0.705				
Trust (0.787)	TR1	0.900	0.939	0.891		
	TR2	0.923				
	TR3	0.877				
	TR4	0.862				
Motivation (0.718)	M1	0.703	0.822	0.536		
	M2	0.701				
	M3	0.763				
	M4	0.758				

Table 1: Discriminant and convergence validity results

Table 2 shows the results of discriminant validity testing for all constructs. Testing results are performed by comparing the AVE root values (values located diagonally in the table) with the correlation value between each construct. If the AVE root value is greater than the correlation value between each construct, then constructs apply in this study have an acceptable discriminant validity (Hair et al., 2010, 2011, 2012).

	Construct	1	2	3	4	5	6	7	8
1	Tangible	**0.759**	0.452	0.424	0.426	0.263	0.519	0.333	0.609
2	Reliability	0.452	**0.725**	0.546	0.526	0.386	0.542	0.270	0.678
3	Responsiveness	0.424	0.546	**0.738**	0.613	0.544	0.697	0.220	0.607
4	Assurance	0.426	0.526	0.613	**0.747**	0.541	0.207	0.285	0.690
5	Emphaty	0.263	0.386	0.544	0.541	**0.828**	0.675	0.198	0.610
6	Satisfaction	0.519	0.542	0.697	0.207	0.675	**0.719**	0.338	0.653
7	Trust	0.333	0.270	0.220	0.285	0.198	0.338	**0.895**	0.167
8	Motivation	0.609	0.678	0.607	0.690	0.610	0.653	0.167	**0.732**

Table 2: Squared Root of AVE and Correlation between Constructs

Based on the results of Table 2, the squared root of AVE for each construct is greater than the value of the correlation between constructs in this study. Thus, constructs apply in this study have acceptable discriminant validity.

Table 3 shows factor analysis test results to prove the validity of each construct and dimension. Also to avoid the possible presence of common method variance bias among constructs.

	Component							
	1	2	3	4	5	6	7	8
T1	.636							
T2	.673							
T3	.841							
T4	.814							
REL3								.755
REL4								.755
RESP1		.748						
RESP2		.827						
RESP3		.642						
RESP4		.661						
ASS2					.826			
ASS3					.805			
ASS4					.624			
EMP1						.788		
EMP2						.775		
EMP3						.791		
EMP4						.817		
KEP1			.601					
KEP2			.694					
KEP3			.798					
KEP4			.705					
TR1				.900				
TR2				.923				
TR3				.877				
TR4				.862				
M1							.703	
M2							.701	
M3							.763	
M4							.758	

Table 3: Result of Discriminant Analysis Using Factor Analysis - Rotated Component Matrix

Extraction Method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalization; Rotation converged in 7 iterations.

Table 3 provides the result of discriminant analysis using factor analysis, which shows that each construct is gathering following the measured construct. In other words, each indicator from a construct is appropriately separated from other construct indicators.

Structural Model Testing

Structural model testing in this study is performed with Structural Equation Modeling (SEM) to test the validity of the research model along with hypotheses proposed with the help of Warp PLS 6 software. The test results are as follows:

Hypotheses	Coefficient	*t* value	Conclusion
H1	0.18	5.52	failure to reject H_0
H2	0.11	4.16	failure to reject H_0
H3	0.33	8.17	failure to reject H_0
H4	0.21	6.01	failure to reject H_0
H5	0.24	6.33	failure to reject H_0
H6	0.38	8.22	failure to reject H_0
H7	0.73	9.12	failure to reject H_0

Table 4: Parameter Structural Estimation

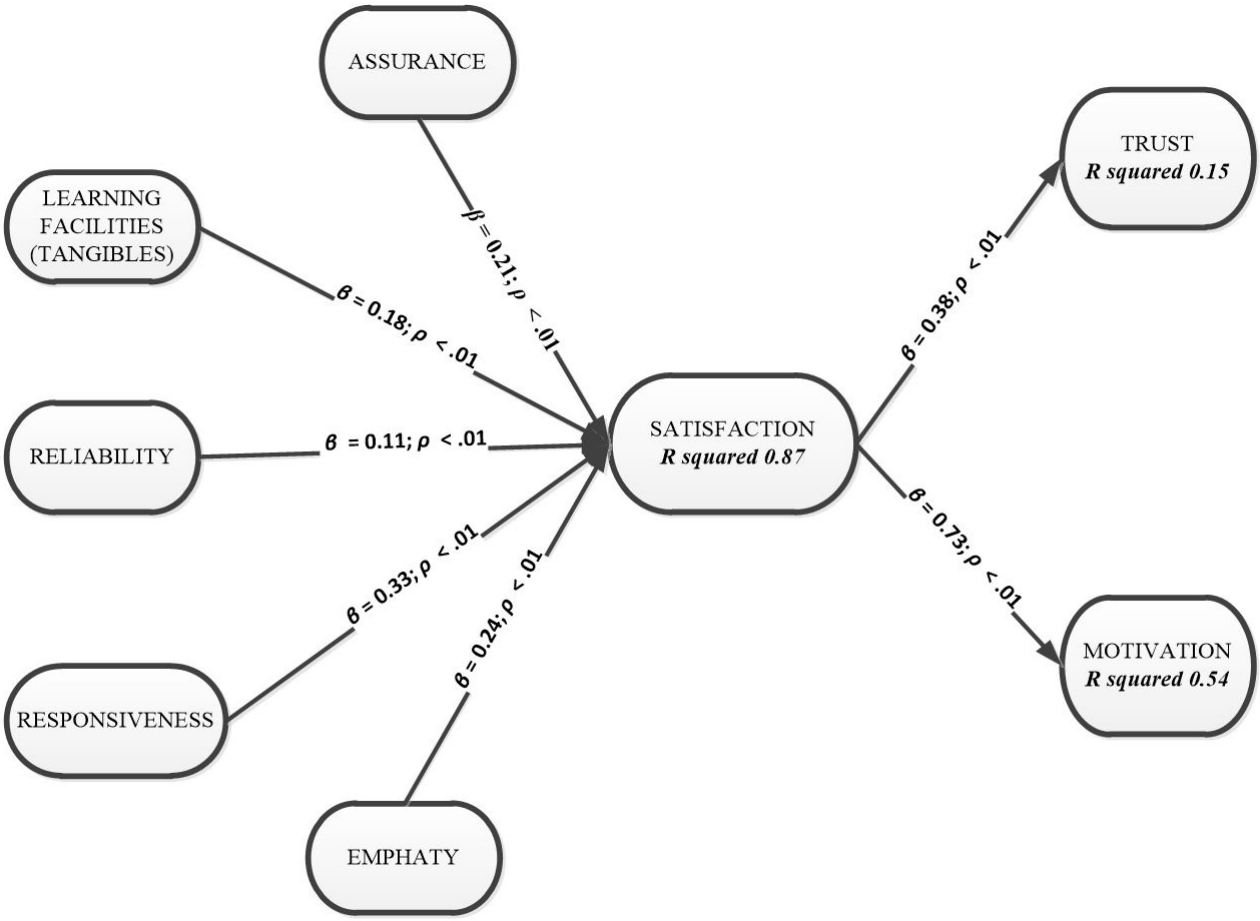

Figure 2: Structural Equation Model with the parameter estimate

Based on Figure 2 and Table 4, the effect of service quality dimensions (tangible, reliability, responsiveness, empathy, assurance) toward participants' satisfaction are significantly positive, as well as their effect toward trust and motivation (Table 4 shows the value of $t > 1.96$, significant at $p < 0.001$). Furthermore, Figure 2 and Table 5 conclude that participants' satisfaction is explained by 87% by service quality. Also, participants' satisfaction explains 15% trust and 54% motivation.

Generally, the research model in this study has an appropriate Goodness of Fit (GoF) index as seen from the output given by the Warp PLS 6 regarding model fit and quality indices.

Average path coefficient (APC)=0.295, p<0.001
Average R-squared (ARS)=0.419, p<0.001
Average adjusted R-squared (AARS)=0.417, p<0.001
Average block VIF (AVIF)=2.048, acceptable if <= 5, ideally <= 3.3
Average full collinearity VIF (AFVIF)=2.565, acceptable if <= 5, ideally <= 3.3
Tenenhaus GoF (GoF)=0.495, small >= 0.1, medium >= 0.25, large >= 0.36
Sympson's paradox ratio (SPR)=1.000, acceptable if >= 0.7, ideally = 1
R-squared contribution ratio (RSCR)=1.000, acceptable if >= 0.9, ideally = 1
Statistical suppression ratio (SSR)=1.000, acceptable if >= 0.7
Nonlinear bivariate causality direction ratio (NLBCDR)=0.857, acceptable if >= 0.7

Table 5: Model fit dan quality indices

Based on the output in Table 5, this study model conforms to the data. The latent variables in this research model do not experience multicollinearity problems. Furthermore, the relationship between latent variables as stated in the research hypotheses is free from Simpson's paradox and the contribution of negative R-squared, which usually occurs together with Simpson's paradox. Table 5 also shows that this research model does not experience causality problems. In other words, the relationship between variables hypothesized, along with the resulting coefficient value, is acceptable. Thus, overall, this research model has an appropriate GoF.

DISCUSSION

The Result of structural parameter estimation using variance-based SEM, with the help of Warp PLS 6, fails to reject Hypothesis 1 (H1), which states that service quality of HR Development Board province intangibles aspect (learning facilities) has a positive effect on the trainees' satisfaction. This result is consistent with Choudhury (2014), which states that Tangible is real evidence of care and attention given by service providers to their consumers. This tangibles dimension will increase the positive image of service providers, especially for consumers, when evaluating service quality (Choudhury, 2014). The leadership education and training participants of echelon 3 and 4 experience a high service quality provided by the HRDBP in Indonesia through the tangible aspect. In this regard, an excellent physical appearance of buildings, study room equipment, learning structure, and completeness of books available in the library of HRDBP are capable of providing satisfaction to participants' of education and training programs.

Furthermore, Hypothesis 2 states that the service quality of HR Development Board in Indonesia from the aspect of reliability has a positive effect on the participants' satisfaction of leadership education, and training is supported. In line with Parasuraman, Zeithaml and Berry (1985); and Budiyanti and Patiro (2018), who find evidence that reliability is the company's ability to carry out services as promised promptly. The importance of this dimension implies that customer satisfaction will decrease if the services provided are not as promised by service providers. Thus, component or element of reliability dimensions is the agency's ability to deliver services properly and charge costs appropriately. In this regard, the reliability aspects of the HRDBP in Indonesia are their ability to assist education and training participants' problems and provide timely services which capable of delivering satisfaction for leadership education and training participants.

Moreover, hypothesis 3 states that the service quality of HRDBP in the responsiveness aspect has a positive effect on the participant's satisfaction is supported. Choudhury (2014) and Kloutsiniotis and Mihail (2018) state that responsiveness is the company's ability, which relates directly to their employees' capability in providing service in a timely and responsive manner. Responsiveness may foster a positive perception of the service quality provided. If there is a failure or delay in the delivery of services, the service provider will mend or minimize consumer losses immediately. This dimension emphasizes on attention and speed of employees in providing respond toward consumer requests, statements and complaints.

Hypothesis 4 states that the service quality of HRDBP in the assurance aspect has a positive effect on participant's satisfaction is supported. According to Kassim and Abdullah (2010) and Fatima and Razzaque (2014), assurance or collateral is employee's knowledge and behavior to build consumer's trust and confidence in consuming the offered services. This dimension is crucial because it involves consumer perceptions towards the risk of high uncertainty concerning the ability of service providers. When HRDBP in Indonesia is able to provide assurance to education and training participants in terms of giving comfort, striving for active participation among participants, and the ability of trusted employees will affect participants' satisfaction.

Hypothesis 5 states that the service quality of HR Development Board Province in Indonesia from the empathy aspect has a positive effect on participant's satisfaction is supported. Ng, David, and Dagger (2011) and Choudhury (2014) conclude that Empathy is a company's ability that relates directly to their employees' ability to pay close attention individually to consumers and sensitive to consumer needs. Thus, the component of this dimension is a combination of access, namely the ease of utilizing services offered by the company, communication which is the ability to give information to consumers or obtain input from consumers, and understanding which is an effort to know and understand the needs and desires of consumers.

The execution of leadership education and training requires sensitivity from the organizers in implementing learning activities as a form of service provided to education and training participants. The results of this study indicate that the empathy aspect of the service quality of HRDBP in terms of focused attention to participants, the ability to give personal attention, the ability to understand participants' needs individually, and the ability to build long-term relationships with participants can satisfy leadership education and training participants.

Hypothesis 6 states that participants' satisfaction in leadership training has a positive effect on their trust toward HRDBP in Indonesia is supported. The results of this study are in line with Kassim and Abdullah (2010), Saleem, Zahra and Yaseen (2017), and Kloutsiniotis and Mihail (2018), who find evidence that trust is a consequence out of customer satisfaction. Similarly, Farndale, Hope-Hailey, and Kelliher (2011) state that customer satisfaction will further shape customer retention, namely, trust. In line with Farndale, Hope-Hailey, and Kelliher (2011), Alfes, Shantz, and Truss (2012) state that customer satisfaction can shape customer trust to maintain the sustainability of long-term relationship between the company and customers.

Hypothesis 7 states that participant's satisfaction in the leadership training had a positive effect on their motivation is supported. The result of this study confirms the findings of Ahmed et al. (2010), who find evidence that service quality affects satisfaction and motivation for students, as argued by Subrahmanyam (2017) that reciprocal relationship between affairs, processes, and other tasks related to the academic field can increase learning motivation. In line with Subrahmanyam (2017), Di Serio, Ibáñez, and Kloos (2013), in their research also show that satisfaction towards environmental conditions, learning facilities, and teachers' abilities are factors that shape students motivation to learn. In this study, HRDBP in Indonesia with excellent environmental conditions, learning equipment, acceptable classroom conditions, as well as high competence of facilitators will deliver the satisfaction to leadership education and training participants, which in turn increases their motivation to learn.

When exerting leadership education and training programs,

participants' satisfaction becomes a crucial factor in maintaining proper relations with participants, especially with their origin institutions. The formation of participants' satisfaction from service quality will establish trust, which drives an excellent image of the HRDBP in Indonesia.

HRDBP in Indonesia must pay close attention to factors that establish service quality due to their ability to affect satisfaction, which will impact participants' trust and motivation. Furthermore, with the existence of satisfaction, trust, and motivation of participants', the reputation of the agency/institution who organized leadership education and training programs will improve. Service quality is strategically crucial due to its ability in establishing satisfaction, trust, and motivation of participants, which will impact their achievement during the education and training process. Thus, HRDBP in Indonesia will foster an excellent image in the eyes of other regional government organizations, which will be contented to send their employees to participate in the education and training program held by this HRDBP.

The results of this study are different from Zeithaml, Parasuraman, and Berry (1990) and Lovelock and Wright (2002) where they conclude that reliability is the most important factor for customers when evaluating service quality. On the other hand, the results of this study conclude that responsiveness is one of the most important factors in influencing leadership education and training of echelon 3 and 4 participants' satisfaction at HRDBP in Indonesia. Thus, HRDBP in Indonesia obliges to pay close attention to responsiveness due to its direct relation with the customer's feeling when the service encounter occurs. Moreover, other service quality aspects (tangible, reliability, empathy, and assurance) complement the responsiveness aspect in forming the service quality of HRDBP in Indonesia.

CONCLUSION

Generally, the results of this study indicate that aspect of service quality with a higher effect toward participants' satisfaction of leadership education and training is responsiveness. Based on the testing result, responsiveness variable has the highest path coefficient value,0.33, compared to other variables of service quality. With this regard, HRDBP in Indonesia manages to provide satisfactory responsiveness to serve leadership education and training participants' needs, willing to make efforts for resolving problems faced by participants, responsive to training participants' requests, and willing to accept criticism and suggestions from participants. Therefore, leadership education and training participants' satisfaction is well established when HRDBP in Indonesia performs excellent responsiveness during leadership education and training process.

Regarding participants' trust, their positive attitude is formed after experiencing satisfactory services provided by the HRDBP, which in turn will shape their trust toward the education and training agency/organization. This study also shows that skills, care, and honesty of all elements in HRDBP in Indonesia are factors that shape the trust of education and training participants toward institutions as training providers. Participants' satisfaction formed from an excellent service quality provided by the agency/institution as a service provider will shape their trust toward the institution. Thus, participants' trust represents an excellent image of the HRDBP as the agency/institution who exert leadership education and training program.

In terms of participants' motivation, service quality has an indirect influence on motivation through satisfaction. The results of this study show that service quality has a positive effect on participants' satisfaction, which in turn has a potential impact on their motivation. Thus, service quality and satisfaction play a significant role in participants' motivation.

One of the major contributions of this study is the adoption of a more comprehensive approach to investigating determinants of trust and motivation compared to previous studies. The literature on the relationships between service quality, satisfaction, trust, and learning motivation is pervasive, but only a few are available in terms of training and development. Thus, this study has a wider coverage of the key dimensions of service quality and their impact on satisfaction, trust, and motivation in training and development on government institution settings.

LIMITATION AND SUGGESTION

This study has several limitations. The first limitation is the selection of respondents, where respondents are only from participants of leadership education and training of echelons 3 and 4. Further research is expected to involve other education and training participants with a different program such as basic leadership training and other technical training programs. Second, this study involved only HRDBP in five provinces in Indonesia. Hence, it is necessary to widen the study area, which includes other provinces in Indonesia to generalize the study results.

Moreover, since this study is considered as the first to investigate the path of service quality to satisfaction, trust and learning motivation at the level of constructs, drawing from DKI Jakarta, South Sulawesi, North Sumatera, East Java, and Central Sulawesi HRDBP perspectives, further research concerning more comprehensive analysis is needed. Comparative studies with other HRDBP in Indonesia is also needed to identify the different effect of service quality dimensions in different provinces, and its effect on satisfaction, trust, and learning motivation. Moreover, the role of cultural issues may be investigated to add further depth to the current model.

REFERENCES

Abili, K., Narenji Thani, F., Mokhtarian, F. and Mehdi Rashidi, M. (2012) 'Assessing quality gap of university services', *Asian Journal on Quality*, Vol. 12, No. 2, pp. 167–175. https://doi.org/10.1108/15982681111158724

Ahmed, I., Nawaz, M.M., Ahmad, Z., Ahmad, Z., Shaukat, M.Z., Usman, A., Rehman, W. and Ahmed, N. (2010) 'Does service quality affect students ' performance? Evidence from institutes of higher learning', *African Journal of Business Management*, Vol. 4, No. 12, pp. 2527–2533.

Akbar, M. M. and Parvez, N. (2009) 'Impact of Service Quality, Trust, And Customer Satisfaction Loyalty', *ABAC Journal*, Vol. 29, No. 1, pp. 24–38.

Alfes, K., Shantz, A. and Truss, C. (2012) 'The link between perceived HRM practices, performance and well-being: the moderating effect of trust in the employer', *Human Resource Management Journal*, Vol. 22, No. 4, pp. 409–427. https://doi.org/10.1111/1748-8583.12005

Amorim, M. and Saghezchi, F. B. (2014) 'An investigation of service quality assessments across retail formats', *International journal of quality and service sciences*, Vol. 6, No. 2/3, pp. 221–236. https://doi.org/10.1108/IJQSS-02-2014-0015

Anderson, J. C., and Gerbing, D.W. (1988) 'Structural Equation Modeling in Practice: A Review and Recommended Two-step Approach', *Psychological Bulletin*, Vol. 103, No.3, pp. 411-423. https://doi.org/10.1037/0033-2909.103.3.411

Blass, E. and Weight, P. (2005) 'The MBA is dead – part 1: God save the MBA!', *On The Horizon*, Vol. 13, No. 4, pp. 229–240. https://doi.org/10.1108/10748120510627358

Budiyanti, H. and Patiro, S. P. S. (2018) 'Perceived Fairness, Emotions, and Intention of Fast Food Chain Restaurants Customers in Indonesia', *Gadjah Mada International Journal of Business*, Vol. 20, No. 2, pp. 229–252. https://doi.org/10.22146/gamaijb.30136

Budiyanti, H., Patiro, S. P. S. and Nurman (2018) 'Organizational Justice Perception of Indonesia Civil Servants, Does It Matter?', *Jurnal Ekonomi dan Bisnis*, Vol. 21, No. 2, pp. 333–360. https://doi.org/10.24914/jeb.v21i2.2017

Budiyanti, H., Yamin, A. and Patiro, S. P. S. (2019) 'Public Service Motivation Measurement: A Test of Perry's Scale in Indonesia', *Jurnal Kebijakan dan Administrasi Publik*, Vol. 23, No. 1, pp. 16–32. https://doi.org/10.22146/jkap.39653

Butt, M. M. and Aftab, M. (2013) 'Incorporating Attitude Towards Halal Banking in An Integrated Service Quality, Satisfaction, Trust and Loyalty Model in Online Islamic Banking Context', *International Journal of Bank Marketing*, Vol. 32, No. 1, pp. 6–23. https://doi.org/10.1108/02652321311292029

Choudhury, K. (2014) 'Service Quality and Word of Mouth: A Study of The Banking Sector', *International Journal of Bank Marketing*, Vol. 32, No. 7, pp. 612–627. https://doi.org/10.1108/IJBM-12-2012-0122

Chua, C. (2004) Perception of Quality in Higher Education Clare Chua. *Proceedings of the Australian Universities Quality Forum 2004*. Adelaide.

Collier, J. E. and Bienstock, C. C. (2009) 'Model Misspecification: Contrasting Formative and Reflective Indicators for A Model of E-Service Quality', *Journal of Marketing Theory and Practice*, Vol. 17, No. 3, pp. 283–293. https://doi.org/10.2753/MTP1069-6679170306

Cook, D. and Artino, A. R. (2016) 'Motivation to Learn : An Overview of Contemporary Theories', *Medical Education*, Vol. 50, No. 1, pp. 997–1014. https://doi.org/10.1111/medu.13074

Cornuel, E. (2005) 'The role of business schools in society', *Journal of Management Development*, Vol. 24, No. 9, pp. 819–829. https://doi.org/10.1108/02621710510621321

Cronin, J. J. and Taylor, S. A. (1992) 'Measuring Service Quality: A Reexamination and Extension', *Journal of Marketing*, Vol. 56, No. 3, pp. 55–68. https://doi.org/10.2307/1252296

Cuthbert, P. F. (1996) 'Managing service quality in HE: is SERVQUAL the answer? Part 1', *Managing Service Quality: An International Journal*, Vol. 6, No. 2, pp. 11–16. https://doi.org/10.1108/09604529610109701

Davies, J., Douglas, A. and Douglas, J. (2007) 'The effect of academic culture on the implementation of the EFQM Excellence Model in UK universities', *Quality Assurance in Education*, Vol. 15, No. 4, pp. 382–401. https://doi.org/10.1108/09684880710829965

Dermitzaki, I., Vavougios, D. and Kotsis, K. T. (2012) 'Adaptation of the Students ' Motivation Towards Science Learning (SMTSL) questionnaire in the Greek language', *European Journal in Psychological Education*, Vol. 28, No. 3, pp. 1–21. https://doi.org/10.1007/s10212-012-0138-1

Di Serio, A., Ibáñez, M. B. and Kloos, C. D. (2013) 'Impact of an augmented reality system on students' motivation for a visual art course', *Computers & Education*, Vol. 68, No. 1, pp. 586–596. http://dx.doi.org/10.1016/j.compedu.2012.03.002

Eccles, J. S. and Wigfield, A. (2002) 'Motivational Beliefs, Values and Goals', *Annual Review of Psychology*, Vol. 53, No.1, pp. 109-132. https://doi.org/10.1146/annurev.psych.53.100901.135153

Farndale, E., Hope-Hailey, V. and Kelliher, C. (2011) 'High commitment performance management: the roles of justice and trust', *Personnel Review*, Vol. 40, No. 1, pp. 5–23. https://doi.org/10.1108/00483481111095492

Fatima, J.K. and Razzaque, M.A. (2014) 'Roles of trust on rapport and satisfaction in services', *Asia Pacific Journal of Marketing and Logistics*, Vol. 26, No. 4, pp. 566–578. https://doi.org/10.1108/APJML-01-2014-0013

Furió Ferri, D., Juan, M., Segui, I. and Vivó Hernando, R. (2015) 'Mobile learning vs. traditional classroom lessons: A comparative study', *Journal of Computer Assisted Learning*, Vol. 31, No. 3, pp. 189–201. https://doi.org/10.1111/jcal.12071

Gefen, D., Rigdon, E. E. and Straub, D. (2011) 'An Update and Extension to SEM Guidelines for Administrative and Social Science Research', *MIS Quarterly*, Vol. 35, No. 2, pp. A1–A7. https://doi.org/10.2307/23044042

Gruber, T., Fuß, S., Voss, R. and Gläser-Zikuda, M. (2010) 'Examining student satisfaction with higher education services: using a new measurement tool', *International Journal of Public Sector Management*, Vol. 23, No. 2, pp. 105–123. https://doi.org/10.1108/09513551011022474

Gwinner, K., Gremler, D., and Bitner, M. J. (1998) 'Relational Benefits in Service Industries: The Customer's Perspective', *Journal of the Academy of Marketing Science*, Vol. 26, No. 2, pp. 101-114. https://doi.org/10.1177/0092070398262002

Hair, J. F., Black, W., Babin, B. and Anderson, R. (2010) *Multivariate Data Analysis*, 7th edition, Edinburgh Gate: Pearson.

Hair, J. F., Ringle, C. M. and Sarstedt, M. (2011) 'PLS-SEM: Indeed a Silver Bullet', *Journal of Marketing Theory and Practice*, Vol. 19, No. 2, pp. 139–152. https://doi.org/10.2753/MTP1069-6679190202

Hair, J. F., Sarstedt, M., Pieper, T. and Ringle, C. M. (2012) 'The use of partial least squares structural equation modeling in strategic management research: A review of past practices and recommendations for future applications', *Long Range Planning*, Vol. 45, No. 5–6, pp. 320–340. https://doi.org/10.1016/j.lrp.2012.09.008

Hsiao, C. and Lin, J. (2008) 'A Study of Service Quality in Public Sector', *International Journal of Electronic Business Management*, Vol. 6, No. 1, pp. 29–37.

Hufton, N. R., Elliot, J. G. and Illushin, L. (2003) 'Teachers' Beliefs about Student Motivation: Similarities and Differences Across Cultures', *Comparative Education*, Vol. 39, No. 3, pp. 367-389. https://doi.org/10.1080/0305006032000134427

Kassim, N. and Abdullah, N. A. (2010) 'The effect of perceived service quality dimensions on customer satisfaction, trust, and loyalty in e-commerce settings: A cross cultural analysis', *Asia Pacific Journal of Marketing and Logistics*, Vol. 22, No. 3, pp. 351–371. https://doi.org/10.1108/13555851011062269

Kloutsiniotis, P.V. and Mihail, D. M. (2018) 'The link between perceived high-performance work practices,employee attitudes and service quality: The mediating and moderating role of trust', *Employee Relations*, Vol. 40, No. 5, pp. 801–821. https://doi.org/10.1108/ER-08-2017-0201

Kock, N. (2013) 'Using WarpPLS in E-Collaboration Studies: What If I Have Only One Group and One Condition', *International Journal of E-Collaboration*, Vol. 9, No. 3, pp. 1–12. https://doi.org/10.4018/jec.2013070101

Laaksonen, T., Jarimo, T. and Kulmata, H. I. (2009) 'Cooperative strategies in customer – supplier relationships: the role of interfirm trust', *International Journal of Production Economics*, Vol.120, No.1, pp. 79–87. https://doi.org/10.1016/j.ijpe.2008.07.029

LAN (2015a) *Peraturan Kepala Lembaga Administrasi Negara* (PERKALAN) [Code of Rule from The Head of State Administrative Institution]. Nomor 19. Jakarta: Lembaga Administrasi Negara

LAN (2015b) *Peraturan Kepala Lembaga Administrasi Negara* (PERKALAN) [Code of Rule from The Head of State Administrative Institution]. Nomor 20. Jakarta: Lembaga Administrasi Negara

Leonnard (2018) 'The Performance of SERVQUAL to Measure Service Quality in Private University', *Journal on Efficiency and Responsibility in Education and Science*, Vol. 11, No. 1, pp. 16–21. https://doi.org/10.7160/eriesj.2018.110103

Lien, C., Wu, J., Chen, Y. and Wang, C. (2014) 'Trust transfer and the effect of service quality on trust in the healthcare industry', *Managing Service Quality: An International Journal*, Vol. 24, No. 4, pp. 399–416. https://doi.org/10.1108/MSQ-11-2013-0255

Lovelock, C. and Wright, L. (2002) *Principles of Service Marketing and Management*, 2nd edition, New Jersey: Pearson.

Lovelock, C. and Gummesson, E. (2004) 'Whither Services Marketing ?', *Journal of Service Research*,Vol. 7, No. 1, pp. 20–41. https://doi.org/10.1177/1094670504266131

McAdam, R. and Welsh, W. (2000) 'A critical review of the business excellence quality model applied to further education colleges', *Quality Assurance in Education*, Vol. 8, No. 3, pp. 120–130. https://doi.org/10.1108/09684880010372716

Meyer, D. K, and Turner, J. C. (2006) 'Re-conceptualizing Emotion and Motivation to Learn in Classroom Contexts', *Educational Psychology Review*, Vol. 18, No. 4, pp.377-390. https://doi.org/10.1007/s10648-006-9032-1

Neuman, L, W. (2014) *Social Research Methods Qualitative and Quantitative Approaches*, 7th edn. Essex, UK: Pearson.

Ng, S., David, M. E. and Dagger, T. S. (2011) 'Generating positive word-of-mouth in the service experience', *Managing Service Quality: An International Journal*, vol. 21, No. 2, pp. 133–151. https://doi.org/10.1108/09604521111113438

O'Cass, A. and Carlson, J. (2012) 'An empirical assessment of consumers' evaluations of web site service quality: conceptualizing and testing a formative model', *Journal of Services Marketing*, Vol. 26, No. 6, pp. 419–434. https://doi.org/10.1108/08876041211257909

Oliveira, O. J. D. and Ferreira, E. (2009) 'Adaptation and application of the SERVQUAL scale in higher education', *The Proceedings of the POMS 20th Annual Conference*, Orlando, FL.

Parasuraman, A., Zeithaml, V. A. and Berry, L. L. (1985) 'A Conceptual Model of Service Quality and its Implication for Future Research (SERVQUAL)', *Journal of Marketing*, Vol. 49, No. 4, pp. 41–50. https://doi.org/10.2307/1251430

Parasuraman, A., Zeithaml, V. A. and Berry, L. L. (1988) 'SERVQUAL: A Multiple-Item scale for Measuring Consumer Perceptions of Service Quality', *Journal of Retailing*, Vol. 64, No. 1, pp. 12-40.

Parasuraman, A., Zeithaml,V. A. and Berry, L. L. (1994) 'Reassessment of Expectations as a Comparison Standard in Measuring Service Quality: implications for Furtiier Research', *Journal of Marketing*, Vol. 58, No. 1, pp. 111-124. https://doi.org/10.2307/1252255

Pariseau, S. E. and McDaniel, J. R. (1997) 'Assessing service quality in schools of business', *International Journal of Quality & Reliability Management*, Vol. 14, No. 3, pp. 204–218. https://doi.org/10.1108/02656719710165455

Rabaa'i, A. (2015) 'Conceptualising IS-service quality as a multi-dimensional formative construct: an empirical analysis', *International Journal of Information Systems and Management*, Vol. 1, No. 3, pp. 240–263. https://doi.org/10.1504/IJISAM.2015.072297

Ramseook-Munhurrun, P., Lukea-Bhiwajee, S. D. and Naidoo, P. (2010) 'Service Quality In The Public Service', *International Journal of Management and Marketing Research*, Vol. 3, No. 1, pp. 37–50.

Ribbink, D., van Riel, A., Liljander, V. and Streukens, S. (2004) 'Comfort your online customer: quality, trust, and loyalty on the internet', *Managing Service Quality, An International Journal*, Vol. 14, No. 6, pp. 446–456. https://doi.org/10.1108/09604520410569784

Robbins, S. P. and Judge, T. A. (2015) *Organizational behavior*, 16th Edition. New Jersey: Pearson.

Saleem, M. A., Zahra, S. and Yaseen, A. (2017) 'Impact of service quality and trust on repurchase intentions – the case of Pakistan airline industry', *Asia Pacific Journal of Marketing and Logistics*, Vol. 29, No. 5, pp. 1136–1159. https://doi.org/10.1108/APJML-10-2016-0192

Schiffman, L. G. and Wisenblit, J. (2015) *Consumer behavior*, 11th edition, Boston: Pearson.

Silvestri,C., Aquilani, B and Ruggieri, A. (2017) 'Service quality and customer satisfaction in thermal tourism', *The TQM Journal*, Vol. 29, No. 1, pp. 55–81. https://doi.org/10.1108/TQM-06-2015-0089

Singh, R. and Khanduja, D. (2010) 'SERVQUAL and Model of Service Quality Gaps: A Framework for Determining and Prioritizing Critical Factors from Faculty Perspective in Higher Education', *International Journal of Engineering Science and Technology*, Vol. 2, No.7, pp. 3297–3304.

Skinner, E. A. and Belmont, M. J. (1993) 'Motivation in the Classroom: Reciprocal Effects of Teacher Behavior and Student Engagement Across the School Year', *Journal of Educational Psychology*, Vol. 85, No. 4, pp. 571–581. https://doi.org/10.1037/0022-0663.85.4.571

Sobral, D. T. (2004) 'What Kind of Motivation Drives Medical Students' Learning Quests?', *Medical Education*, Vol. 38, No. 9, pp. 950-957. https://doi.org/10.1111/j.1365-2929.2004.01913.x

Stukalina, Y. (2010) 'Using quality management procedures in education: Managing the learner-centered educational environment', *Technological and Economic Development of Economy*, Vol. 16, No. 1, pp. 75–93. https://doi.org/10.3846/tede.2010.05

Subrahmanyam, A. (2017) 'Relationship between service quality, satisfaction, motivation and loyalty: A multi-dimensional perspective', *Quality Assurance in Education*, Vol. 25, No. 2, pp. 171–188. https://doi.org/10.1108/QAE-04-2013-0016

Subrahmanyam, A. and Bellamkonda, R. S. (2012) 'Development of HiEdQUAL for Measuring Service Quality in Indian Higher Education Sector', *International Journal of Innovation, Management and Technology*, Vol. 3, No. 4, pp. 412–416. https://doi.org/10.7763/IJIMT.2012.V3.265

Subrahmanyam, A. and Bellamkonda, R. S. (2016) 'Effect of student perceived service quality on student satisfaction, loyalty and motivation in Indian universities Development of HiEduQual', *Journal of Modelling in Management*, Vol. 11, No. 2, pp. 448–517. https://doi.org/10.1108/JM2-01-2014-0010

Subrahmanyam, A., Bellamkonda, R. S. and Mishra, R. K. (2013) 'Critical review on issues and challenges to measure service quality in higher education', *International Journal of Current Research*, Vol. 5, No. 1, pp. 38–41.

Sweis, R., Diab, H., Mahmoud Saleh, F., Suifan, T. and Dahiyat, S. (2016) 'Assessing service quality in secondary schools: the case of Jordan', *Benchmarking: An International Journal*, Vol. 23, No. 5, pp. 1207-1226. https://doi.org/10.1108/BIJ-04-2015-0031

Tenenhaus, M., Amato, S. and Esposito Vinzi, V. (2004) 'A global goodness-of-fit index for PLS structural equation modelling', *Proceedings of the XLII SIS scientific meeting*, Padova, pp. 739-742.

Wolfgang, M. E., and Dowling, W. D (1981) 'Differences in Motivation of Adult and Younger Undergraduates', *Journal of Higher Education*, Vol. 52, N0. 6, pp. 640-646. https://doi.org/10.1080/00221546.1981.11778136

Zeithaml, V. A., Parasuraman, A. and Berry, L. L. (1990) *Delivering Service Quality: Balancing Consumer Perception and Expectations*. New York: The free press.

Zimmerman, B. J. (2008) 'Investigating Self-Regulation and Motivation: Historical Background, Methodological Developments, and Future Prospects', *American Educational Research Journal*, Vol. 45, No. 1, pp. 166-183. https://doi.org/10.3102/0002831207312909