Why are University Teachers in Northeastern China Lost? An Analysis based on the Survey of Teachers’ Intention to Leave

Yannan Yang
Lecturer, School of Vocational Education, Tianjin University of Technology and Education, Tianjin, China
Doctor, Faculty of Education, Northeast Normal University, Changchun, Jilin, China
yangyn584@nenu.edu.cn

Zhengyu Ma
Algorithm Development Engineer, Department of Network Intelligence Platform System, ZTE Corporation, Tianjin, China
mazhengyu@korea.ac.kr

Xia Xue
Associate Professor, Faculty of Education, Northeast Normal University, Changchun, Jilin, China
Corresponding Author
xiax793@nenu.edu.cn

Abstract

In recent years, universities in northeastern China have been losing teachers. This paper uses the survey results of university teachers in Northeastern China to analyze the factors that cause the loss of teachers in universities in Northeastern China. Based on the findings of this study, the factors that affect the flow tendency of teachers at worklife include promotion and development, university management, working conditions, salary and interpersonal relationship, of which promotion and development has the greatest impact. The factors that affect the flow tendency of teachers in the external environment include family responsibility, organizational prestige, conditions for talent acquisition and urban living environment, of which organizational prestige has the greatest impact. To alleviate the loss of teachers in universities from northeastern China, universities can improve the promotion and development
channels of teachers, perfect their working conditions and management level, raise the basic salary standard of teachers and establish a remuneration system for distribution according to performance. For good measure, they can also stabilize the current teachers while attracting more outstanding talents by exploiting the advantages of location, making more efforts to build high-level disciplines, and offering more favorable conditions for talent introduction.

Keywords

Northeastern China – university teachers – the loss of teachers – teachers’ intention to leave

1 Introduction

In recent years, there has been a continuous outflow of teachers from universities in northeastern China, especially after the start of the “double first-class” initiative. The construction of first-class universities and first-class disciplines needs to be backed by first-class teachers, resulting in intensifying competition for limited talents among universities. The Northeast region in China has a land area of 1.47 million square kilometers, accounting for 15.3% of the country’s land area and a population of about 121 million. The Northeast region has fertile and vast land and a large population. As China’s old industrial base, the economy started early. At the end of the 1950s, the GDP of the Northeast region accounted for more than 15% of the country’s total GDP. However, as China’s heavy industry began to migrate to the west, the economic development of the Northeast region began to slow down. Since the 1980s, the proportion of GDP in the Northeast region has begun to decline. In 2021, the total GDP of the Northeast region will be 5.57 trillion-yuan, accounting for only 4.9% of the country’s total GDP.

Seen from the overall change in the number of teachers engaged in higher education in northeastern China, in 2015, the number of full-time teachers in universities (institutions) nationwide was about 1.603 million, and the average number of full-time teachers in the universities of northeastern China was

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1 “Double first-class” is the abbreviation for building first-class universities and first-class disciplines. It is another national strategy in the field of higher education in China after the “211 Project” and “985 Project”, which is conducive to enhancing the comprehensive strength and international competitiveness of China’s higher education.
about 52,000,\(^2\) with the national share of full-time teachers in northeastern China being 3.24%. As of 2019, the number of full-time teachers in universities (institutions) nationwide was about 1.74 million, and the average number of full-time teachers in northeastern China was about 50,000,\(^3\) with the national share of full-time faculty members in northeastern China decreasing to 2.87%. Taking the senior full-time teachers who can represent high-level talent resources as an example, in 2015, the number of senior full-time teachers in universities (institutions) nationwide was about 197,500, and the average number of senior full-time teachers in northeastern China was about 7700, accounting for 3.89% of the national total. In 2019, the number of senior full-time teachers in universities (institutions) nationwide was about 230,300, and the average number of senior full-time teachers in northeastern China was about 8300, down to 3.59% of the total. Whether it is full-time teachers or high-level talents, the national proportion of teachers in universities in northeastern China continues to decline. Seen from a university within northeastern China alone, a university in Harbin, Heilongjiang Province lost 15 full-time teachers in 2015 alone, and in addition to those who flowed to enterprises and institutions, those who were still engaged in the higher education field chose universities in the southern and eastern regions but did not stay within the three northeastern provinces.\(^4\) Due to the relatively backward development of economy and higher education in northeastern China, it is difficult to retain the existing talents, which leads to the increasingly serious problem of talent outflow from their universities.

The two-way flow of teachers in higher education is reasonable, and this “mutual” flow can make the distribution of university faculty more reasonable and deepen the integration of different academic backgrounds, among other advantages. However, the one-way and unreasonable flow of teachers would break the dynamic balance of faculty engaged in higher education, affect the normal teaching order, and even hinder the healthy development of higher education. However, northeastern China are subject to the unreasonable one-way flow. The problem of talent drain from universities in northeastern China


has already attracted attention from the national level. The “Guiding Opinions of the Leading Party Group of the Ministry of Education of the People's Republic of China on Accelerating the Development of High-level Talents in universities Directly under the Ministry of Education” released in July 2017 clearly states that "universities in the eastern region are not encouraged to introduce talents from their counterparts in the central, western and north-eastern regions."\(^5\) However, the problem of talent outflow from universities in northeastern China still exists, and how to effectively solve this problem needs to be valued by academic circles.

To sum up, it is urgent to solve the problem of how to alleviate the problem of continuous loss of teachers from universities in northeastern China in their higher education fields. In this paper, an attempt is made to solve this problem from the perspective of teachers' propensity to leave, which refers to employees' intention to leave an organization after working in the organization for a period and after consideration.\(^6\) On the one hand, because the intention to leave is the best variable for predicting employees' departure,\(^7\) it is also the most intuitive and easy to investigate, and some surveys found that the intention to leave is highly correlated with the actual departure behavior.\(^8\) On the other hand, it is difficult to collect data directly on the loss of teachers in the northeastern provinces because the distribution of the loss of teachers in northeastern China is scattered and irregular.

The study is based on two points: 1. What are the specific manifestations of teachers' intention to leave universities in northeast of China? 2. What are the factors that influence the intention of university teachers from northeastern China to leave? Taking these two research questions as the starting point, the questionnaire survey was conducted among the teachers in universities in northeastern China, and the answers were given based on the collation and analysis of the questionnaire.


2 Literature Review

Human resource is an important force to support the development of a region. For Northeast China, due to its location on the border, and compared with other regions, Northeast China has poor climatic conditions and backward economic development. In addition, in recent years, the competition for talents in various regions has become increasingly fierce, which has led to a very serious brain drain in Northeast China. University teachers belong to high-level knowledge-based talents, and as an important force in promoting regional development, their loss cannot be underestimated. Zhao Lili pointed out that because the comprehensive strength of the Northeast region cannot match the developed regions such as the eastern region, the flow deficit of college teachers in the Northeast region is large, and it is no longer able to withstand the continued loss of talents. Shi Lei specifically analyzed the flow of teachers in universities in a certain province in the Northeast region, and found that the brain drain problem in universities in that province is more serious, and most of them are highly educated young teachers and middle-aged teachers with high qualifications. Tang Xinxin's research on another city in the Northeast region found a similar conclusion. The problem of teacher turnover in universities in this city is serious, and the flow direction is single. Most of them flows into universities in central cities and southeast coastal cities, and a small part of them flows into western universities that urgently need high-level talents.

Facing the reality of the continuous loss of talents in the Northeast region, some researchers have explored the reasons. The common factors that cause the brain drain in Northeast China include: economic factors, social factors,

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natural environment factors, etc. University teachers belong to high-level knowledge-based talents, which have characteristics that are different from ordinary talents, so the reasons for their loss are often different from ordinary talents. For university teachers, the reasons for their outflow from the Northeast region are: the school management system is rigid; the communication between the upper and lower levels is not smooth, which affects the daily work of teachers; the average salary of teachers in the Northeast region is lower than that of other capital cities, etc.

Overall, the current research on the brain drain in universities is relatively sufficient. The researchers have conducted in-depth research on the causes and preventive measures of the brain drain in universities. However, the research on the problem of teacher turnover in universities in the Northeast region is still insufficient, and it is mostly theoretical research. The research results are still insufficient and cannot effectively support the improvement of the problem of teacher turnover in universities in the Northeast region.

3 Manifestation of Leaving Tendency of Teachers in Universities in Northeastern China

This research uses a quantitative research method, which can quantitatively express problems and phenomena, and then analyze, test and explain them, so as to obtain meaningful research methods. This research mainly uses the questionnaire method to investigate the flow tendency of teachers in universities. Its purpose is to investigate the basic situation of the flow tendency of teachers in universities in Northeastern China and the various factors affecting the flow tendency of teachers in universities.

In terms of data analysis, SPSS and AMOS software were used to analyze the collected questionnaire data to understand the relationship between various influencing factors and the tendency of university teachers to move. First, the research uses SPSS software to perform descriptive statistical analysis and variance analysis of the collected data. Calculate the frequency distribution and percentage of various demographic variables of the recovered samples through descriptive statistical analysis to understand the composition of the samples.

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by calculating the percentage of related variables and cross-linking tables, we can understand the flow frequency and flow tendency of teachers in universities in Northeastern China. The analysis of variance is used to understand the differences in the demographic characteristics of the flow tendency of teachers in universities in Northeastern China. Second, compared with traditional data analysis, the structural equation model has the advantages of being able to process multiple dependent variables at the same time, and being able to estimate the factor structure and factor relationship at the same time. Therefore, in this study, AMOS software is used to analyze the structural equation model of the theoretical framework of the influencing factors of teachers’ flow tendency in universities. Then based on the path coefficients in the analysis of the structural equation model, the degree of influence of each influencing factor on teachers’ flow tendency in universities is understood through calculation.

3.1 Data Collection

Based on the Minnesota Satisfaction Questionnaire (MSQ), Farh’s “Intent to Leave Scale” and Dai Jianbo’s “Survey on Teachers’ Mobility in Local universities,”17 and the results of interviews with 14 university teachers who have the intention to leave their jobs in northeastern China, this study compiled the “Questionnaire on Turnover Intention of Universities Teachers.”

The questionnaire consists of three parts: the first part is about the basic information of teachers, including gender, age and educational background; the second part is about the intention of teachers to leave and job satisfaction; the third part is about the factors influencing the intention of teachers to leave, including worklife factors (promotion and development, salary, university management, working conditions and interpersonal relationship) and external factors (family responsibility, organizational prestige, conditions for talent acquisition, and urban living environment). The questionnaires were distributed to universities of “211 Project”,18 and “985 Project”19 and general undergraduate universities in northeastern China by mail and questionnaire star in August 2020. A total of 205 questionnaires were collected, of which 200

18 “211 Project” refers to the construction project of about 100 key institutions of higher learning and a number of key disciplines for the 21st century. It was officially launched in November 1995 with the approval of The State Council.
19 “985 Project” is a major decision made at the turn of the century to build a world-class university. A total of 39 universities have been approved to build “985 Project”. 
were valid, with a recovery efficiency of 97.6%, and the specific information is shown in Table 1.

### Table 1 Sample descriptive statistics

<table>
<thead>
<tr>
<th>Category</th>
<th>Category description</th>
<th>Sample size</th>
<th>Proportion %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>77</td>
<td>38.5%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>123</td>
<td>61.5%</td>
</tr>
<tr>
<td>Age</td>
<td>35 years old and below</td>
<td>51</td>
<td>25.5%</td>
</tr>
<tr>
<td></td>
<td>36–45 years old</td>
<td>98</td>
<td>49.0%</td>
</tr>
<tr>
<td></td>
<td>46–55 years old</td>
<td>45</td>
<td>22.5%</td>
</tr>
<tr>
<td></td>
<td>56 years old and above</td>
<td>6</td>
<td>3.0%</td>
</tr>
<tr>
<td>Education</td>
<td>Undergraduate</td>
<td>14</td>
<td>7.0%</td>
</tr>
<tr>
<td></td>
<td>Postgraduate</td>
<td>55</td>
<td>27.5%</td>
</tr>
<tr>
<td></td>
<td>PhD student</td>
<td>131</td>
<td>65.5%</td>
</tr>
<tr>
<td>Work University</td>
<td>“985 Project”</td>
<td>71</td>
<td>35.5%</td>
</tr>
<tr>
<td>Level</td>
<td>“211 Project”</td>
<td>49</td>
<td>24.5%</td>
</tr>
<tr>
<td></td>
<td>General undergraduate</td>
<td>80</td>
<td>40.0%</td>
</tr>
<tr>
<td></td>
<td>universities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching Age</td>
<td>5 years and below</td>
<td>38</td>
<td>19.0%</td>
</tr>
<tr>
<td></td>
<td>6–10 years</td>
<td>34</td>
<td>17.0%</td>
</tr>
<tr>
<td></td>
<td>11–15 years</td>
<td>56</td>
<td>28.0%</td>
</tr>
<tr>
<td></td>
<td>16–20 years</td>
<td>33</td>
<td>16.5%</td>
</tr>
<tr>
<td></td>
<td>21 years and above</td>
<td>39</td>
<td>19.5%</td>
</tr>
<tr>
<td>Job Title</td>
<td>Undecided job title</td>
<td>10</td>
<td>5.0%</td>
</tr>
<tr>
<td></td>
<td>Teaching assistant</td>
<td>6</td>
<td>3.0%</td>
</tr>
<tr>
<td></td>
<td>Lecturer</td>
<td>70</td>
<td>35.0%</td>
</tr>
<tr>
<td></td>
<td>Associate professor</td>
<td>80</td>
<td>40.0%</td>
</tr>
<tr>
<td></td>
<td>Professor</td>
<td>34</td>
<td>17.0%</td>
</tr>
<tr>
<td>Marital Status</td>
<td>Married</td>
<td>177</td>
<td>88.5%</td>
</tr>
<tr>
<td></td>
<td>Unmarried</td>
<td>23</td>
<td>11.5%</td>
</tr>
</tbody>
</table>

Source: The data comes from the questionnaire collected in this study.

In this survey, 18.5% of university teachers showed a very strong intention to leave; 54% of teachers had an intention to leave; and only 27.5% of teachers had no intention to leave, which was lower than the level of 29.7% in the
survey of “National College and University Teacher Development Quality.”

Nationwide, teachers in northeastern China show a higher intention to leave. Only 20.5% of the teachers who have the intention to leave want to stay in Northeast of China, partly for the sake of family stability, but if they change jobs to other provinces, they must face problems such as transferring their children to other schools and moving their spouses with them, so the mobility cost is too high. In addition to Northeast of China, East of China (34.9%), South of China (24.0%) and North of China (13.0%) are the regions where teachers in northeastern China generally prefer to work.

In other words, most teachers would choose to leave the northeast region for more economically developed regions if given the opportunity. University administrators should focus on these potentially lost teachers and take appropriate measures to avoid more university talent loss from the source.

3.2 Analysis of the Differences of Teachers’ Intention to Leave Universities in Northeastern China

Through the independent sample T-test and ANOVA analysis of variance, it is found that there are differences in the turnover of teachers in universities in northeastern China in terms of educational background, types of universities they are working at and teaching age. The results show that teachers with doctoral degrees have higher intention to leave their jobs and are significantly higher than those with bachelor's degrees. Higher academic qualifications imply that teachers are eligible to change jobs. However, teachers with master's degrees, especially those with bachelor's degrees, are not eligible and do not have the initiative to move between universities and are not at an advantage in the academic labor market, so they will show a relatively low propensity to leave.

In terms of the types of universities they are working at, teachers working in general undergraduate universities have a higher intention to leave than those working in universities of “985 Project” and “211 Project”. Maslow’s hierarchical of needs demand proposes that human needs can be divided into five levels: physiological needs, safety needs, belonging and love needs, esteem needs and self-actualization needs. According to the hierarchy theory of needs, when the lower-level needs are satisfied, university teachers will start to focus on the higher-level needs such as career development and self-worth realization.

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Undoubtedly, the higher-level universities boast more resources, more research support and broader academic development space, which are very favorable to teachers’ career development and self-worth realization and can satisfy their higher-level needs. Therefore, teachers from general undergraduate universities hope to get more development opportunities by flowing to higher level universities. In terms of teaching age, teachers with 6–10 years of teaching experience show a higher intention to leave. Compared with teachers of other teaching ages, teachers with 6–10 years of teaching experience have already acquired certain research achievements and teaching experience, and they are younger on average, have mobility chips and vitality, and hope to obtain better remuneration through mobility. As a result, university teachers at this stage show a higher propensity to leave.

### Table 2
Variance analysis table for comparison of turnover intention of teachers in different universities

<table>
<thead>
<tr>
<th>Category</th>
<th>Category description</th>
<th>Mean (Standard Deviation)</th>
<th>F Test</th>
<th>Post hoc test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>3.39 (1.15)</td>
<td>-1.188</td>
<td>n.s.</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>3.59 (1.20)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>35 years old and below</td>
<td>2.74 (1.29)</td>
<td>2.025</td>
<td>n.s.</td>
</tr>
<tr>
<td></td>
<td>36–45 years old</td>
<td>2.50 (1.11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>46–55 years old</td>
<td>2.16 (1.17)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>56 years old and above</td>
<td>2.50 (1.22)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>Undergraduate (A)</td>
<td>1.79 (1.31)</td>
<td>3.394*</td>
<td>C&gt;A</td>
</tr>
<tr>
<td></td>
<td>Postgraduate (B)</td>
<td>2.38 (1.22)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PhD student (C)</td>
<td>2.69 (1.18)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work University</td>
<td>“985 Project” (D)</td>
<td>2.20 (1.18)</td>
<td>7.808**</td>
<td>F&gt;E</td>
</tr>
<tr>
<td>Level</td>
<td>“211 Project” (E)</td>
<td>2.27 (1.13)</td>
<td></td>
<td>F&gt;D</td>
</tr>
<tr>
<td></td>
<td>General undergraduate universities (F)</td>
<td>2.88 (1.12)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching Age</td>
<td>5 years and below (G)</td>
<td>2.55 (1.22)</td>
<td>2.524*</td>
<td>H&gt;J</td>
</tr>
<tr>
<td></td>
<td>6–10 years (H)</td>
<td>2.80 (1.17)</td>
<td></td>
<td>H&gt;K</td>
</tr>
<tr>
<td></td>
<td>11–15 years (I)</td>
<td>2.68 (1.11)</td>
<td></td>
<td>I&gt;K</td>
</tr>
<tr>
<td></td>
<td>16–20 years (J)</td>
<td>2.21 (1.11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>21 years and above (K)</td>
<td>2.10 (1.21)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In addition, the propensity of university teachers in the three northeastern provinces to leave is not statistically significant in several aspects of gender, age, job title and marital status. There is no significant difference in the propensity of university teachers in northeastern China to leave with different gender, age, job title and marital status, which is different from the results of previous studies. In terms of gender, the results of Gu Zhiyuan’s study\textsuperscript{21} showed that male teachers had higher propensity to leave their jobs than female teachers, while the results of Rausch’s study\textsuperscript{22} showed that female teachers were more likely to leave their universities they were working at. In terms of age, Gu found that middle-aged teachers had the highest propensity to leave, while Ambrose\textsuperscript{23} found that younger teachers showed a higher turnover rate. In terms of title, some studies showed significant differences in the propensity to leave by title,

\begin{table}
\centering
\begin{tabular}{llll}
\hline
Category & Category description & Mean (Standard Deviation) & F Test & Post hoc test \\
\hline
Job Title & Undecided job title & 2.40 (1.26) & 1.658 & n.s. \\
& Teaching assistant & 2.33 (0.82) & & \\
& Lecturer & 2.73 (1.23) & & \\
& Associate professor & 2.25 (1.08) & & \\
& Professor & 2.59 (1.18) & & \\
Marital Status & Married & 3.53 (1.19) & 0.345 & n.s. \\
& Unmarried & 3.43 (1.61) & & \\
\hline
\end{tabular}
\caption{Variance analysis table for comparison (cont.)}
\end{table}

Notes: n.s. means \(p > 0.05\), no difference between groups; * means \(p < 0.05\); ** means \(p < 0.01\)

\textbf{Source:} The data comes from the collation of the results of independent sample T-test and ANOVA difference analysis of questionnaire data using SPSS


with higher title groups showing a higher propensity to leave. As for marital status, some studies found no significant difference in the propensity to leave among teachers by marital status, but some studies also showed that married teachers have a lower propensity to leave.

The results of previous studies on the propensity to leave and the differences between different groups of teachers in higher education share nothing identical, and there are some differences between this study and the previous studies. This may be due to the influence of sample size on the one hand, as it is easier to get the conclusion of significant differences when the sample size is very large. On the other hand, it may be due to the different sources of samples (different countries and regions); for example, the sample of Rausch’s study came from abroad, and the sample of Gu’s (2010) study came from a nationwide sample of college and university teachers. In contrast, the sample of this study was drawn from universities in the northeastern provinces, which is one of the important reasons that can cause the differences in the research results.

Then, what other factors, besides teachers’ own demographic factors, may affect the turnover of university teachers? This requires further analysis of the factors influencing the tendency of university teachers to leave their jobs.

4 Identification of Factors Influencing Teachers’ Intention to Leave in Northeastern China

4.1 Model Construction

According to the “push-pull theory”, university teachers’ intention to leave is not only influenced by the current worklife, but also by the external environment. Some factors in the current work environment cause teachers’ dissatisfaction and push them away, which makes them tend to leave; while some factors in the external environment attract teachers and pull them out of their original workplace, which also affects teachers’ tendency to leave. Therefore, based on the “push-pull theory”, in this paper, the factors influencing teachers’ intention to leave the university are identified from two aspects: pushing force and pulling force.

There are many conceptual frameworks in which to study the worklives of faculty members across different types and missions of institutions. But there was no uniform standard for the classification of employees’ intention to leave in terms of worklife and external factors at home and abroad. In this study, by reviewing the literature and synthesizing the results of interviews with 14 university teachers, the top categories of factors were selected with respect to posing influence on the intention to leave among university teachers in northeastern China. The worklife included “promotion and development”, “university management”, “salary”, “working conditions” and “interpersonal relationship”. Worklife directly influence teachers’ job satisfaction, job satisfaction is the mediating factor between worklife and teacher turnover intention.

The external factors included “family responsibility”, “organizational prestige”, “conditions for talent acquisition” and “urban living environment”. A model of factors influencing the intention of university teachers to leave was constructed (Fig. 1): the push factor of current work and the pull factor of external environment jointly influence the intention of university teachers to leave. Among the push factors, the worklife through job satisfaction then affects the intention to leave; among the pull factors, the external factors direct impacts on the intention to leave of teachers.

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4.2 Analysis of the Role of Factors Influencing the Tendency of University Teachers to Leave

The results of the fit of the model show that all the indicators of the structural equation model of factors influencing university teachers’ tendency to leave \((\text{CMIN/DF} = 2.093, \text{CFI} = 0.911 > 0.9, \text{IFI} = 0.912 > 0.9, \text{TLI} = 0.903 > 0.9, \text{RMSEA} = 0.074 < 0.08)\) meet the requirements of the test, which indicates that the structural equation model and the data fit well and can be analyzed next.

Figure 2 shows the relationships and path coefficients among the variables in the structural model. Among the push factors, worklife poses a positive impact on teachers’ job satisfaction (the standardized path coefficient is 0.23), that is, a good worklife can make teachers more satisfied at their jobs; worklife influences teachers’ job satisfaction and thus their intention to leave (the standardized path coefficient is \(-0.10\)); job satisfaction has a significant negative influence on teachers’ turnover intention (the standardized path coefficient is \(-0.42\)), which means that the higher the job satisfaction of university teachers, the lower their tendency to leave. Among the pull factors, external factors pose positive impact on teachers’ intention to leave (the standardized path coefficient is 0.26), and the better the external environment is, the higher the tendency of teachers to leave. The results of the study are consistent with our intuition and previous research findings.\(^{27,28}\)

Teachers’ turnover intention is influenced by both push and pull forces, but the push force plays a more positive role than the pull one. Specifically, at first, the intention of teachers to leave their jobs was triggered by certain factors in their current jobs, which led them to look for outside job opportunities.


At this point, the pull force of the external environment begins to play a role, and in the process of reinforcing the pull force, teachers’ intention to leave becomes more stronger until they finally leave. The structural model of factors influencing teachers’ intention to leave has been analyzed and discussed above, among which the two dimensions of work environment perception and external environment perception are somewhat abstract, and further calculations are required to understand the specific degree of influence of each factor in these two dimensions.

4.2.1 Worklife Triggers University Teachers’ Intention to Leave
To get an insight into the specific influence of each factor under work environment perception, in this paper, weighted least squares estimation method is employed to calculate and the regression equation of the second-order measurement model in the model is as follows:

\[
UM = \gamma_1 WL + e_1 \\
FD = \gamma_2 WL + e_2 \\
SA = \gamma_3 WL + e_3 \\
WC = \gamma_4 WL + e_4 \\
FR = \gamma_5 WL + e_5
\]

The second-order variable FW is abstracted from the five first-order variables. Let \( X = (UM, FD, SA, WC, FR)' \), then the equation (1) is expressed in matrix as follows: \( X = \gamma' WL + \varepsilon \). The weighted least squares estimate of FL is (where \( \gamma = (0.72, 0.94, 0.79, 0.77, 0.69)', D \) is a fifth-order square):

\[
\hat{WL} = (\gamma' \hat{D}^{-1} \hat{\gamma})^{-1} \hat{\gamma}' \hat{D}^{-1} X
\]

The following result is obtained after calculation:

\[
\text{Worklife} = 0.13 \times \text{University Management} + 0.12 \times \text{Salary} + 0.16 \times \text{Working Conditions} + 0.66 \times \text{Promotion and Development} + 0.11 \times \text{Interpersonal Relationship}
\]

This result illustrates the degree of influence of each factor in worklife. According to the calculation results, the factors of work environment perception could fall into three levels of forces: first, high intensity push effect, including promotion and development; second, medium intensity push effect, including working conditions; and third, general push effect, including school
management, salary status and interpersonal relationships. The correspondence between the influencing factors of the teachers’ flow tendency in universities in Maslow’s hierarchical hierarchy theory is shown in Figure 3.

First, promotion and development are the most valued factors for university teachers in their current work. Among the worklife, promotion and development account for the largest part, which indicates that the most important concern of university teachers in the three northeastern provinces in their work is how to develop in the future and whether they can get promotion successfully. In Maslow’s hierarchical theory of needs, self-actualization needs belong to the highest level of individual needs. Self-actualization needs refer to the need for a person to do the work he is most suitable for, realize his greatest potential, realize his ideals, and be able to continuously create and develop himself. The promotion and development are to some extent the concrete manifestation of self-worth realization, which is the highest level of needs and becomes the goal for teachers to pursue after the lower-level needs are satisfied. After working in a university for a period, teachers’ salary, work environment and other aspects tend to be stable and not easy to produce large changes, so the lower-level needs have been satisfied and teachers will start to pursue higher level needs. Promotion and development represent the recognition of their abilities by peers and the management, and the process of gaining respect from others, i.e., the realization of self-worth.

Figure 3 Maslow’s hierarchical theory of needs

Source: Maslow’s Hierarchy of Needs – Physiological, Safety, Social (thepeakperformancecenter.com)
Second, university teachers need favorable working conditions to support their daily work. Even being weaker than the influence degree of promotion and development, the degree of influence of working conditions is stronger among all the perceived factors of work environment, which is a medium-intensity push. Working conditions mainly include campus environment, teachers' daily office conditions, hardware facilities of the university, etc., which are the most closely contacted by teachers in their daily teaching and research work. Each organization exists in a specific physical and technological environment and must be adapted to it. If universities do not provide favorable working conditions for teachers, it will reduce their job satisfaction. Therefore, the organization should make ongoing efforts to improve the working conditions to guarantee the most basic conditions for teachers' work so that they can carry out their daily work smoothly.

Thirdly, the well-managed university, salary status and interpersonal relationship can help to reduce teachers' dissatisfaction and maintain their original work efficiency. University management (0.13), salary status (0.12) and interpersonal relationship (0.11) are relatively close and weak with respect to their influence degrees. From the perspective of two-factor theory, these three factors belong to health care factors, and the lack of these factors tends to trigger teachers' dissatisfaction and negative work emotions; if these factors can be improved, they will eliminate teachers' dissatisfaction and maintain their original work efficiency. University management is the closest contact in teachers' work and plays a significant supporting role in serving teachers' daily teaching and research, so it will pose some impacts on teachers' job satisfaction. Salary status, which includes teachers' income, insurance, and benefits, is a lower level and the need easier to satisfy in the hierarchy of needs. After getting employed in a university, teachers' salary will not fluctuate too much, so its weighting order is relatively low compared with the previous categories of factors in the perception of work environment. Interpersonal relationship is a kind of social relationship established by people in production and life, and the dysfunction of the relationship will pose a certain impact on the quality of work and life. Teachers' daily interpersonal relationships mainly include teacher-teacher relationship, teacher-student relationship, and teacher-leader relationship. Good or bad interpersonal relationships pose a certain impact on teachers' job satisfaction, which in turn affects their tendency to leave the profession. A survey shows that 87.7% of teachers believe that interpersonal relationships pose a certain impact on their career mobility (Dai, 2017), and keeping good interpersonal relationships can reduce teachers' turnover rate.

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to a certain extent. In Maslow’s hierarchical theory of needs, human relations belong to the needs of love and belonging, and their level is higher than that of working conditions, school management, and salary status. However, in this study, interpersonal relationships have the weakest influence on the mobility tendency of university teachers. This may be due to the strong independence of teachers in universities in their daily work, so interpersonal relationships have the smallest influence on the mobility tendency of teachers.

4.2.2 The External Factors Strengthen University Teachers’ Intention to Leave

After the push factor triggers the intention of university teachers to leave, the pull force generated by the external environment will come into play and keep strengthening the intention of teachers to leave until they finally leave their original workplace. To understand the specific influence of each factor under the perception of external environment, the regression equation of the second-order measurement model in the model is calculated in the same way as above, the equation of the second-order measurement model in the model is:

\[
FR = \theta_{1}EF + \varphi_{1}
\]

\[
OR = \theta_{2}EF + \varphi_{2}
\]

\[
CA = \theta_{3}EF + \varphi_{3}
\]

\[
UE = \theta_{4}EF + \varphi_{4}
\]

Let \( Y = (FR, OR, CA, UE)' \), then the equation (3) is expressed in matrix as follows: \( Y = \bar{\theta}^{*}EF + \bar{\varphi} \). The weighted least squares estimate of \( EF \) is (where \( \bar{\theta} = (0.75, 0.90, 0.82, 0.72)' \), \( \bar{R} \) is a fourth-order square):

\[
\bar{EF} = (\bar{\theta}'\bar{R}^{-1}\bar{\theta})^{-1}\bar{\theta}'\bar{R}^{-1}Y
\]

The following result is obtained after calculation:

**External factors = 0.19*Family Responsibility + 0.56*Organizational Prestige + 0.28*Conditions for Talent Acquisition + 0.17*Urban Living Environment**

This result illustrates the degree of influence of each factor in the perception of external factors. Based on the calculation results, the factors of external fall into three levels of forces: first, high intensity pull effect, including organizational prestige; second, medium intensity pull effect, including conditions for talent acquisition; and third, general intensity pull effect, including family responsibilities and urban living environment.
First, university teachers prefer to work in universities with higher organizational prestige. Organizational prestige (0.56) is the most important component of the pull factor, and Matier's study found that the prestige of a university is an important factor for its teachers' retention. In general, the level of a university and its organizational prestige are directly proportional to each other, and universities at higher levels represent superior development platforms, favorable research environment, etc., which are more conducive to teachers' future development and self-fulfillment, and this is an important reason for the greatest attraction to university teachers after they have the intention to leave.

Second, favorable introduction conditions have a strong auxiliary effect on attracting talents. The influence of the conditions for talent acquisition (0.28) on teachers' intention to leave is second only to organizational prestige. The conditions for talent acquisition mainly refer to remuneration, settlement fee, housing, etc. On the one hand, the conditions for talent acquisition can meet the basic survival needs of teachers and ensure that their daily life and work needs are met; on the other hand, the conditions for talent acquisition are also a kind of recognition of teachers' ability, and better treatment to a certain extent means that teachers have higher ability, which also makes teachers' higher level of respect and self-fulfillment needs to be satisfied. This also explains why, in the context of “double first-class” construction, universities compete for talents by offering favorable treatment, and better conditions for talent acquisition help attract more talents.

Third, family responsibilities and urban living environment are external factors that cannot be ignored to intensify the tendency of university teachers to leave their jobs. Family responsibilities (0.19) mainly cover children's education, elderly support, and the consideration for spouse's workplace. The recruitment of teachers in universities generally requires doctoral degree or above, and the age of postgraduate study is also in the traditional sense of marriageable age, so the proportion of married teachers in universities is high. Married teachers accounted for 88.5% of the sample in this survey, so family responsibilities are also an important factor for university teachers when they consider whether to leave their jobs. The urban living environment (0.17) includes natural environment and economic environment, and these factors will also pose an impact on the tendency of university teachers to leave their jobs. The natural environment is the basic condition on which human life depends. Nationwide, northeastern China do not have advantages both in terms of geographical location and climate conditions. The Northeast region has a temperate monsoon climate with four distinct seasons. The summer is

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warm and short, the winter is cold, dry and long. The minimum temperature in winter can reach minus 30 degrees, and the surface snow cover has a long time. It is an area with more snowfall in China. This is one of the reasons for the loss of university teachers in northeastern China want to leave. In addition, the economic environment of northeastern China is relatively backward nationwide, and there is a mutually reinforcing relationship between the economy and higher education, which also hinders the development of higher education. Overall, northeastern China fail to show superiority in terms of urban living environment, which poses some impacts on the teacher drain in universities.

5 Discussion

Under the current reality of continuous talent loss in universities in northeastern China provinces, timely measures are needed to stabilize the potential loss group. The study found that there are various factors influencing the intention of teachers to leave the university in northeastern China, and there are differences in the influences. Based on the results of this study, the following suggestions are made to alleviate the brain drain problem in universities in northeastern China.

1. Increase the number of teachers for annual professional title evaluation and smooth the promotion and development channels of teachers. The problem of poor promotion of teachers has always existed in many universities. Due to the limited number of teachers for annual professional title evaluation, many teachers who have long reached the promotion standard still have to wait in the queue, and even needs to wait for several years, so the teachers have strong dissatisfaction and even leave. This study finds that teachers with doctoral degrees have stronger perceptions of promotion and development, and if promotion is blocked it is easy to cause the loss of this group and bring serious impact to the development of universities. As an increasing number of universities make having a doctoral degree as a threshold condition in recruitment, the proportion of teachers with doctoral degree among university teachers will become increasingly large.

To avoid the brain drain caused by poor promotion channels, it requires universities to establish perfect and smooth promotion channels as soon as possible, so that teachers can get promotion smoothly. For example, it is possible to increase the number of teachers for annual title assessment while the title assessment of university teachers is delegated to universities or cancel the upper limit of the number of teachers for annual title assessment, and completely take the promotion standard as the decisive index for assessment. In
doing so, we can break the obstacles of non-professional factors for teachers who have reached the promotion conditions.

2. Improve the working conditions and management level of universities to effectively serve teachers’ education and teaching work. The previous survey found that working conditions have a moderate strength push effect on teachers’ tendency to leave. In terms of working conditions, teachers’ daily teaching and research work needs to be backed by certain physical and technical environment, which requires organizations to offer favorable working conditions. However, due to the uneven distribution of educational resources among universities in northeastern China, the basic multimedia teaching equipment in some universities is old or even incomplete, which affects teachers’ job satisfaction to a certain extent and thus triggers teachers’ tendency to leave. In this regard, universities should first ensure the availability and normal operation of existing hardware education and teaching equipment to avoid hindering the normal teaching and research progress of teachers due to equipment. In addition, when it is affordable, the working conditions should be gradually improved such as campus environment and office conditions.

Meanwhile, university management also constitutes an important part that triggers the tendency of university teachers to leave their jobs, and it is found through the variance analysis that teachers working in the general undergraduate universities have a stronger demand for good university management. In this study, it is found that some teachers in general undergraduate universities spent a lot of time on dealing with office report layout, fund management and other trivial things, which seriously affected teachers’ teaching and research work and caused teachers’ dissatisfaction. In this regard, universities should do a good job of institutional construction and define the power boundaries of all interested parties by making statutes, in a bid to avoid teachers from taking extra administrative work due to unclear responsibilities and reduce teachers’ job satisfaction.

In addition, universities should make ongoing efforts to improve the professional quality of teaching assistants so that they can provide better service for teachers’ daily work to avoid the loss of teachers due to university management problems.

3. Uphold the principle of fairness and perfect the remuneration system for university teachers. The remuneration system is practically related to teachers’ personal interests, and it is necessary to ensure fairness within and outside the organization respectively. First, universities should ensure the fairness of remuneration within the organization. Among the 200 teachers surveyed in this study, only 29% of them expressed their satisfaction with the fairness of the current remuneration system, and more of them expressed their
dissatisfaction with the fairness. Adams’ equity theory suggests that employees will judge the fairness of the compensation they receive through horizontal and vertical comparisons, and the sense of unfairness that arises from the comparison will affect their future pay. Universities can ensure the internal fairness of teachers’ remuneration and improve their job satisfaction by developing reasonable performance appraisal methods and implementing performance appraisal in a fair and equitable manner. What’s more, it is important to ensure the fairness of teachers’ remuneration outside the organization, that is, the fairness when compared with people with the same educational background outside the organization.

The survey shows that the remuneration level of teachers in universities in China lags those with the same educational background, and more than half of the teachers in this study also indicated that there is a gap between their income and social status, and the remuneration of teachers in universities needs to be further improved. “Several Opinions on Deepening the Reform of Streamlining Administration and Delegating Power to the Lower Levels, Integrating Power Delegation with Tightened Oversight, and Optimizing Services” released in April 2017 proposed “to improve the remuneration distribution system to make it in line with the characteristics of modern universities with those of Chinese characteristics,” and universities in the three Northeastern Provinces can consider the characteristics of teachers’ work in different majors and positions, and try the remuneration system such as annual remuneration system and agreed remuneration system. In doing so, teachers can be stabilized by the remuneration with both internal and external fairness, and then attract teachers from other regions.

4. Tap regional advantages, strengthen the construction of high-level disciplines, and continuously improve the organization’s prestige. Among the pull factors, organizational prestige poses the greatest impact on teachers’ tendency to leave, which shows that organizations with high reputation can attract more talents, which also confirms the saying “man struggles upwards”, which requires universities to improve organizational prestige to attract more talents to join.

In this paper, organizational prestige covers university prestige and discipline prestige, among which the improvement of discipline prestige has an


important basic role in the improvement of university prestige. For university teachers, the sense of belonging to the discipline is stronger than the sense of belonging to the university, and the professional field of the discipline plays a more important role in their development than the university organization. Many teachers pay more attention to the prestige of their disciplines when they look for external job opportunities, so universities can start from improving the prestige of their disciplines when improving the prestige of their organizations. Based on their own advantages of “localization,” universities in northeastern China, by revolving around the economic development needs of the provinces, can explore the disciplines that are not easily replaced nationwide and carry out targeted construction, realize the differentiated development of disciplines, create the “brand effect” of the development of disciplines in northeastern China, and continuously improve the prestige of disciplines. The improvement of organizational prestige is a long-term project, and universities should make long-term and complete plans and make ongoing efforts to achieve the final purpose of improving organization prestige.

5. Introduce university talents in different levels. The construction of “double first-class” cannot proceed without the support of talents. Facing the problem of talent loss in universities in northeastern China, the universities should stabilize teachers through various measures on the one hand and introduce talents on the other. In this study, it is found that teachers of different ages perceive the external environment differently, which can be used as a basis for introducing university talents in different levels. First, it is found that teachers above 56 years old have stronger perception of talent introduction conditions; teachers at this age generally belong to “leading talents” in university talent introduction, and favorable conditions for talent acquisition can effectively attract such talents to join. In this regard, universities can improve the allowances and rewards appropriate to the level of talents as one of the important conditions to attract this group of teachers.

Secondly, on the introduction of middle-aged teachers, this study finds that teachers aged 46 or above have a stronger sense of family responsibility and they need a stable life more. Thirdly, for the introduction of young teachers, considering that the external environment of northeastern China is not advantageous in terms of geographic location and climate conditions, which may cause certain obstacles to attract talents, universities in northeastern China can attract students from local universities and those studying outside the provinces by giving priority to them, thus reducing the obstacles of talent introduction due to external environment.

In this study, interpersonal relationships and urban living conditions are also factors that pose impact on teachers’ tendency to leave, which are either caused
by personal subjective factors, or require government support, or are not easy to be improved in the short term. Therefore, this study mainly starts from the university level, and makes suggestions for those aspects that universities can grasp and make improvements immediately, while the impact and improvement of other factors need to be further investigated in future studies.

6 Conclusion

In this study, a survey and analysis of 200 university teachers in northeastern China based on push-pull theory found that teachers showed a high intention to leave their jobs. Through further research, it was found that among the push factors, job satisfaction mediates the relationship between work environment perception and teachers’ tendency to leave, and external factors have a direct influence on the intention to leave. Among the factors of worklife, promotion and development posed the biggest impact on teachers, followed by working conditions, and university management, salary status and interpersonal relationships had the weakest influence. There are differences in the propensity to leave among teachers with different degrees, different types of universities, and different ages. Specifically, teachers with doctoral degrees value promotion and development more; teachers working in general undergraduate universities and teachers with lecturer titles value university management more. Regarding the external factors, organizational prestige has the strongest influence on teachers; conditions for talent acquisition have the second strongest influence; family responsibilities and urban living environment have the weakest influence. Among them, female teachers attach more importance to organizational prestige than male teachers; teachers aged 46 and above attach more importance to family responsibilities; while teachers aged 56 and above attach great importance to organizational prestige, conditions for talent acquisition and family responsibilities.

References


About the Authors

YanNan Yang was born in Harbin, Heilongjiang, PR China, in 1987. She received the PhD from Northeast Normal University. Now she is a lecturer at School of Vocational Education, Tianjin University of Technology and Education. Her main research area is education management and policy.

ZhengYu Ma was born in Harbin, Heilongjiang, PR China, in 1987. He received the Ph.D. from Korea University, South Korea. Now, he works in Network Intelligence Platform System Department, ZTE Corporation. His main research area is methods of data analysis and data mining.
Xue Xia was born in Changchun, Jilin, PR China, in 1981. She received her master degree from Northeast Normal University and Ph.D. from Beijing Normal University in China. Now she is an associated professor of Faculty of Education, Northeast Normal University. Her main research area is education management.