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A Research on the Effect of Learner Attribution on Performance Under the Mediation of Online Learning Environment

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Abstract: Online learners’ learning attribution has a significant effect on their learning behavior motivation and other psychological characteristics, and affects their learning performance through the change of learning behavior. The focus of this research is: What changes the learning behavior of online learners during the intermediate process? How does its mode of action relate to online learners’ learning attribution? This research adopts the method of the role of mediating variable and takes online learning environment as the intermediary variable to test the direct effect of learning attribution on learning performance and the indirect effect through the mediating effect of online learning environment, and the regression model generated by the mediating effect analysis predicts learning performance. The results show that luck attribution has no effect on learning performance. Ability attribution, effort attribution and background attribution have no direct effect on learning performance. However, some indirect effects can be generated through the mediating effect of online learning environment, among which the total effort attribution has significant indirect effects through the pedagogy of online learning environment. Overall background attributions, ability and effort attributions in success attributions, and background attributions in failure attributions have significant indirect effects through the pedagogy, technology, and community mediating effects of online learning environments. All of the above indirect effects can positively predict learning performance, which provides a guiding ideology with practical significance for the construction elements of online learning environment.

Keywords: online learner, achievement attribution, performance, online learning environment, mediate, mediating variable, direct effect, indirect effect

Introduction

Bernard Weiner (Weiner 1986) pointed out that people’s future behavior is partially determined by the observable causes of previous results. This view can be understood as Weiner’s most simplified description of attribution. When people are aware of the cause of the previous results, they always try to adjust their behavior, which will lead to different results. Several subsequent researches on learning attribution suggest that the significant effect of learning attribution on learning motivation, learning expectation and psychological characteristics, which is transmitted to learners’ achievement behavior and ultimately effects their learning performance (Pokay & Blumenfield, 1990; Sui, 1991; Liao, 1993). At the same time, many researches have shown that the learning environment has also a significant effect on the achievement behavior of the students (Zhang, 2020).
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clear whether learning attribution has a direct impact on learning behavior or academic performance, as well as its effect weight. Some researches conclusions show that: learning attribution has no significant effect on academic performance, and it is difficult to link it with teaching practice. It is speculated that this is probably because it is separated from the social component, environmental effect and group background of the learning affecting factors (Zhou, Dong, 1994).

As the research focus of attribution theory gradually shifts from the attribution process to the attribution effect, the discussion of various affecting factors and the relationship of action becomes the spotlight. Accordingly, the research on achievement motivation begins to focus on the control source, controllability, emotional response, responsibility inference and responsibility behavior of attribution. It is also found that attributional control source, stability and controllability effect responsible behavior by affecting emotional response. Research on interpersonal communication also shows that behavioral cause control, emotional response and responsibility inference are significantly correlated, and have a significant impact on the willingness to help. The role of interpersonal affecting factors in the learning environment has a significant effect on the emotional response and interactive behavior formed by different learning attribution (Xing, Yao, 2009; Liu, 2002; Sui, 2005).

At the same time, due to the appearance of online learning in the digital environment, the interaction between learner success and failure attribution on learning behavior and learning performance has become a hot topic. Online learning conditions provide learners with cognitive function, analysis function, knowledge construction function, knowledge expansion function, interaction function, collaborative learning function, self-assessment function, etc. (Mioduser, Nachmias, Lahav, Avigail, 2000; Mioduser, Nachmias, Oren, Lahav, 1999; Zabel, Linroth & Fairman, 2010), enables learners to directly obtain the support and training of self-efficacy, cognition, effort, diversity, suitability and other strategies. For learners with different learning attributions, how will these support and training effect their learning performance? The trilateral relationship between learners’ attribution of success or failure, characteristics of online learning environment and learning performance has become the most concerned topic.

It can be seen that the attribution orientation of online learners to learning performance has become one of the core elements to be considered in the construction of online learning environment. Some researches on online learning show that positive learners are more inclined to internal control attribution (Zhong, Zhao, 2006). Therefore, the design and evaluation criteria of online learning environment aiming at the diversity and effectiveness of learning activities have become the mainstream design ideas (Zhang, 2004; Xu, 2003). For example, learning evaluation model proposes that the establishment of virtual learning environment should have: control interaction, interaction activities, interaction space and interaction members. Oren et al. explained that the control of interaction and interaction space is a technology orientation, while interaction activities and members are community orientation. On the basis of refining the technology and community, the pedagogy concept is supplemented, and the three dimensions of learning evaluation model are constructed: community, technology and pedagogy (Oren et al., 2006), as shown in Figure 1. The contents of the three dimensions are as follows:
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**Community dimensions:** sense of belonging, existential of presence, status definitions; **Technology dimensions:** immersivity, multi-user options, communication means, meta-level features; **Pedagogy dimensions:** hyperlink-curriculum, collaborative learning, virtual/classroom relationships, educator’s function, interactions. Oren et al. also used the Learnet model to analyze and evaluate multiple e-learning communities to test the completeness and effectiveness of the model.

Based on the Learnet model, the Institute of knowledge science and engineering of Beijing Normal University has developed an online learning environment measurement scale, and has carried out the measurement of online learners in the Institute of online education. The scale includes: measuring learners’ evaluation of online learning environment in community, technology and pedagogy aspects, measuring learners’ attribution, and measuring learners’ learning performance.

**Variables**

| Dimensions       | 0       | 1       | 2       | 3       |
|------------------|---------|---------|---------|---------|
| Sense of belonging | none    | class registration | personal registration | developer/contributor |
| Extent of presence | none    | occasional | within a course | daily |
| Status definitions | none    | predefined | guests’ rights | full members’ rights and duties |
| Immersivity      | text-based | 2D graphics | 2.5D graphics | virtual reality-3D graphics |
| Multi-user options | none    | collaborative work | collaborative work | collaborative work |
| Communication means | none    | e-mail | asynchronous | synchronous |
| Meta-level features | none    | web structure | collaborative work with peers | collaborative work with peers |
| Hyper-curriculum | book    | internal links | external links | web structure |
| Collaborative learning | none    | collaborative work in class-room | collaborative work between schools | collaborative work with peers |
| Virtual/classroom relationship | mainly classroom activity | virtual/_class_room activity | virtual/_classroom activity | virtual/_classroom activity |
| Educator’s function | class-room teacher | virtual tutors | virtual tutors | virtual tutors |
| Interactions      | browsing | activation and observation | question answering | telem-manipulation/java/vrml |

**Research Design**

Under the online learning environment, whether learners’ learning attribution has effect on learning performance, directly or indirectly through the learning environment. If it is through the mediating effect of the learning environment, and in what way. This is the most interesting question in this research.

Figure 1 Learnet evaluation model variable scale (Oren et al., 2006)

**Figure 2**

Learning attribution has effect on learning performance, directly or indirectly through the learning environment.

(1) **The experimental hypotheses of this research**

First of all, it is necessary to clarify whether there is a correlation between online learners’ learning attribution, online learning environment and learning performance. If the correlation exists, we can further study the interaction between them and the mode of action.

Hypothesis 1: the learning attribution of online learners is significantly related to their learning performance;

Hypothesis 2: online learning environment is significantly related to learners’ learning performance;

Hypothesis 3: learning attribution of online learners is significantly related to online learning environment.

This paper further discusses whether the relationship between learners’ learning attribution and learning performance directly affects the relationship or indirectly through the mediating effect of online learning environment.

Hypothesis 4: the direct effect of online learners’ learning attribution on learning performance is significant;

If Hypothesis 4 is rejected, we can further explore:

Hypothesis 5: learning attribution of online learners indirectly affects learning performance through the mediating effect of online learning environment.

(2) **The validity and reliability of the subjects and scales in this research**

Figure 2 learning attribution has effect on learning performance, directly or indirectly through the learning environment.
The research randomly selected 250 online learners from the online education learning centers of J University in Tianjin, Shenzhen in Guangdong, Guilin in Guangxi and Zhaotong in Yunnan. 239 questionnaires were collected, of which 208 were valid, with the recovery rate of 95.6% and the effective rate of 83.2%. Boys accounted for 36.5% of the subjects, while girls accounted for 56.7%. The average age was 29.31 years old, ranging from 20 to 50 years old. Grade 1-3, major involves Chinese language and literature, mathematics and other nine majors.

### a. Measurement of online learning environment

The online learning environment measurement and evaluation scale (Liang, Peng, Wang, Huang, Chen, 2007) was used as the measurement. It is a Likert 5-point scale. Through structural validity analysis, the variables with load less than 0.4 or higher and similar load in more than two factors were deleted. Table 1 is obtained.

| Dimension | No. | Topic overview                                                                 |
|-----------|-----|---------------------------------------------------------------------------------|
| Pedagogy  | 1   | The course learning requirements put forward clearly.                            |
|           | 2   | The learning materials related to the course are clearly listed.                 |
|           | 3   | The contents of the syllabus are clearly provided.                              |
|           | 4   | The time limit for handing in homework is clearly defined.                      |
|           | 5   | The course activity plan is detailed and reasonable.                            |
|           | 6   | The description of the course content is clear and clear.                       |
|           | 7   | Sufficient and abundant curriculum resources (such as previous examination papers, teachers' teaching plans, etc.). |
|           | 8   | The course materials are suitable for self-study.                               |
|           | 9   | Homework questions help to deepen understanding.                               |
|           | 10  | Allow to view homework and exam scores.                                        |
|           | 11  | Teachers can give feedback on homework in time.                                |
|           | 12  | I often do online testing provided on the platform.                            |
|           | 13  | Friendly and convenient learning interface.                                     |
|           | 14  | Learning materials are instant and convenient.                                 |
| Technology| 15  | Fast and effective network links.                                               |
|           | 16  | The operation function is complete and reasonable.                             |
|           | 17  | Communication tools facilitate interaction (e.g. forum, web QQ, chat room, etc.).|
|           | 18  | "Digital Library" is very useful.                                               |
| Community | 19  | The shared space is easy to obtain the learning materials provided by students. |
|           | 20  | Bulletin board provides instant course information.                            |
|           | 21  | Get help with software operation in real time.                                 |
|           | 22  | Get technical help for platform operation in real time (such as downloading plug-ins, uploading files, etc.). |
|           | 23  | Provide FAQs about network technology.                                          |
|           | 40  | In the learning activities, I got a good friendship with my classmates.         |
|           | 42  | I got help from other students in the learning activities.                      |
|           | 43  | Very willing to participate in peer learning, discussion and communication.     |
|           | 45  | Highly recognize and trust the course tutor.                                   |
|           | 47  | In case of difficulties, one can get help from tutors or classmates.           |
|           | 48  | I seek help from tutors or classmates often, besides learning difficulties.     |

SPSS 22.0 was used for KMO and Bartlett tests, as shown in Table 2. The results show that the data support factor analysis to test the validity of the structure.

| Kaiser-Meyer-Olkin Measure of Sampling Adequacy | 8.49 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 1913.66713 |
| df | 406 |
| Sig. | 0.000 |
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b. Measurement of online learners’ learning attribution

There are 24 variables of learning attribution (see Table 5) in the online learning environment measurement and evaluation questionnaire, including total attribution, success attribution and failure attribution.

| No. | Attribution | Topic overview                                                                 |
|-----|-------------|---------------------------------------------------------------------------------|
| 1   |             | Learning ability determines the level of achievement.                           |
| 2   |             | Study hard determines the level of achievement.                                 |
| 3   |             | The standard of scoring determines the level of achievement.                   |
| 4   |             | Luck determines the level of achievement.                                      |
| 5   |             | The level of achievement reflects the ability to learn.                        |
| 6   |             | The achievement level reflects the study hard or not.                          |
| 7   |             | The level of achievement reflects the ease of the course.                      |
| 8   |             | The level of achievement reflects luck.                                         |
| 9   |             | I got good grades because I have strong learning ability.                      |
| 10  |             | I got good grades because I study very hard.                                   |
| 11  |             | I got good grades because the course is very easy.                             |
| 12  |             | I got good grades because I was very lucky.                                    |
| 13  | Success attribution | My learning ability is very strong, so I got good grades.                     |
| 14  |             | I studied very hard, so I got good grades.                                    |
| 15  |             | I gave my tutor a good impression, so I got good grades.                       |
| 16  |             | I was very lucky, so I got good grades.                                        |
| 17  | Failure attribution | My poor grades are due to my poor learning ability.                           |
| 18  |             | My poor grades are without hard work.                                          |
| 19  |             | My poor grades are due to tutors bad lectures.                                 |
| 20  |             | My poor grades are due to bad luck.                                            |
| 21  |             | I really don't have the ability to learn this course well.                    |
| 22  |             | I didn't work hard on the course.                                              |
| 23  |             | Tutors were too strict in marking papers.                                      |
| 24  |             | I can't do anything well with bad luck.                                        |

The AMOS V21.0 structural equation model SEM was used for confirmatory factor analysis to evaluate the structural validity of measurement.

As Table 3 shows, X^2(Chi-Square)/df = 2.307, indicating that the consistency between the sample covariance matrix and the expected covariance matrix is relatively high (2-5 indicates that the model is acceptable, the smaller the similarity is, the better the model fitting is). NFI (normed fit index), IFI (incremental fit index), TLI (Tucker Lewis index) and CFI (comparative fit index) are closer to 1, the better. RMSEA (Root Mean Square Error of Approximation) is acceptable as below 0.08. The above indexes indicate that the SEM model of online learning environment evaluation measurement has good structural validity.

Table 3 Online learning environment quality fitting index

| Fitting index | X^2 | DF | X^2/df | NFI | IFI | TLI | CFI | RMSEA |
|--------------|-----|----|--------|-----|-----|-----|-----|-------|
| 862.993      | 374 | 2.307 | 0.657 | 0.772 | 0.726 | 0.765 | 0.079 |

The factor load matrix in Table 4 shows that the factor load of each topic is above 0.400, which conforms to the standard of factor analysis structural model. Confirmatory factor analysis finally produced three dimensions (factors): Community, Technology and Pedagogy.

F Pedagogy = 0.493*c1 + 0.409*c2 + 0.570*c3 + 0.478*c4 + 0.633*c5 + 0.529*c6 + 0.568*c7 + 0.429*c8 + 0.606*c9 + 0.578*c10 + 0.627*c11 + 0.480*c12

F Technology = 0.560*c13 + 0.651*c14 + 0.453*c15 + 0.662*c16 + 0.497*c17 + 0.599*c18

F Community = 0.416*c24 + 0.494*c25 + 0.595*c26 + 0.674*c27 + 0.758*c28 + 0.488*c29

The reliability statistics Cronbach's alpha N of items is 0.911, which indicates that the consistency of online learning environment data is very high.

Table 4 Item factor load matrix of online learning environment questionna

| pedagogy load | technology load | community load |
|---------------|-----------------|----------------|
| C1 0.493      | C13 0.560       | C24 0.416      |
| C2 0.409      | C14 0.651       | C25 0.494      |
| C3 0.570      | C15 0.453       | C26 0.595      |
| C4 0.478      | C16 0.662       | C27 0.674      |
| C6 0.529      | C18 0.599       | C29 0.488      |
| C7 0.568      | C19 0.611       |                |
| C8 0.429      | C20 0.690       |                |
| C9 0.606      | C21 0.732       |                |
| C10 0.578     | C22 0.653       |                |
| C11 0.627     | C23 0.574       |                |
| C12 0.480     |                 |                |
Learning performance satisfaction is the average of the nine items of online learners’ satisfaction with their own learning effect. It comes from two parts. One is self-evaluation of 9 items of online learners’ learning performance. The other part is the average of the seven periodic exams. Since the two-part measurement itself is different and not comparable, it defines performance as the sum of two standard points (Z scores), which not only reflects the academic performance of online learners, but also reflects their relative position in the overall situation.

The reliability statistics Cronbach’s alpha N of items is 0.858, which indicates that the consistency of learning performance data is very high.

The experiment is to explore the relationship between online learners’ learning attribution, online learning environment and learning performance. If there is no significant correlation between the three, there is no direct and indirect impact completely.

(1) Correlation analysis of learning attribution, online learning environment and learning performance of Online Learners

| No. | Topic overview                                                                 |
|-----|--------------------------------------------------------------------------------|
| 1   | More and more interested in the professional knowledge learned.                 |
| 2   | The ability to think has improved.                                             |
| 3   | The ability to analyze and solve practical problems has improved.              |
| 4   | The ability to discuss and communicate with others has improved.               |
| 5   | The ability to actively obtain information and learn independently has improved.|
| 6   | Have mastered the basic principles in the discipline deeply.                    |
| 7   | Have mastered the basic concepts and knowledge of the subject.                 |
| 8   | Have mastered the basic skills of the subject.                                 |
| 9   | Have mastered the integration of knowledge.                                    |

Research Results

The results of correlation analysis in Table 7 show that the ability, effort and background of learning attribution are positively correlated with learning performance, while luck has no correlation with learning performance. It indicates luck as the attribution of external uncontrollable instability, is not related to learning performance. This indicates that the attribution intensity of internal control and stability is significantly positively correlated with the perceived level of online learning environment. However, luck in learning attribution is related to the pedagogy and technology of online learning environment, but not to the community of online learning environment.

| No. | Topic overview                                                                 |
|-----|--------------------------------------------------------------------------------|
| 1   | More and more interested in the professional knowledge learned.                 |
| 2   | The ability to think has improved.                                             |
| 3   | The ability to analyze and solve practical problems has improved.              |
| 4   | The ability to discuss and communicate with others has improved.               |
| 5   | The ability to actively obtain information and learn independently has improved.|
| 6   | Have mastered the basic principles in the discipline deeply.                    |
| 7   | Have mastered the basic concepts and knowledge of the subject.                 |
| 8   | Have mastered the basic skills of the subject.                                 |
| 9   | Have mastered the integration of knowledge.                                    |

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b. The correlation analysis of online learning environment and learners’ learning performance

The results of correlation analysis in Table 8 show that there is a significant positive correlation between pedagogy, technology, community and learning performance in online learning environment. It can be understood as that online learners’ evaluation of online learning environment is positively correlated with learning performance.

Table 9 Correlation matrix of learning attribution and learning performance

| Ability  | Effort    | Background | Luck    |
|----------|-----------|------------|---------|
| Pedagogy | .233**    | .165*      | .187**  | .155*   |
| Technology | .321**    | .240**     | .203**  | .142*   |
| Community | .265**    | .226**     | .189**  | .117    |

To sum up, the correlation analysis among online learners’ learning attribution, online learning environment and learning performance shows that luck attribution in learning attribution belongs to external uncontrollable and unstable attribution, and its attribution level is not related to learning performance level, so it cannot predict learning performance significantly and has no effect. The other attribution of learning attribution: ability, effort and background have significant positive correlation with online learning environment and learning performance. Thus, it constitutes the necessary condition of positive prediction.

Conclusion: In hypothesis 1, hypothesis 2 and hypothesis 3, all hypotheses are acceptable except that the hypothesis that luck attribution is significantly related to learning performance is rejected. On this basis, it is necessary to further analyze the effect of learning attribution ability, effort and background on learning performance.
(2) Analysis of the effect of online learners’ learning attribution on learning performance

PROCESS Procedure for SPSS Release 2.16.3 was used to conduct the mediation effect test, and a regression model was generated to analyze the direct effect of online learners’ learning attribution on learning performance and the indirect effect through online learning environment. This effect will predict learning performance.

a. An analysis of the direct and indirect effects of ability attribution on learning performance mediated by online learning environment

The results in table 10 show that the direct effects of total ability attribution, success ability attribution and failure ability attribution on learning performance are sig > 0.05, which are not significant.

Table 10 The direct and indirect effects of ability attribution on learning performance

| DIRECT AND INDIRECT EFFECTS | Effect | Sig |
|-----------------------------|--------|-----|
| Total ability attribution   |        |     |
| Direct                      | 0.1556 | 0.2481 |
| Indirect Pedagogy           | 0.0850 | 0.0517 |
| Technology                  | 0.0294 | 0.0685 |
| Community                   | 0.0952 | 0.0620 |
| Total                       | 0.2097 | 0.0576 |
| Success ability attribution |        |     |
| Direct                      | 0.0642 | 0.5514 |
| Indirect Pedagogy           | 0.0589*| 0.0373 |
| Technology                  | 0.0257*| 0.0473 |
| Community                   | 0.0702*| 0.0463 |
| Total                       | 0.15480| 0.0477 |
| Failure ability attribution |        |     |
| Direct                      | 0.1551 | 0.1794 |
| Indirect Pedagogy           | 0.0618*| 0.0373 |
| Technology                  | 0.0215*| 0.0473 |
| Community                   | 0.0696*| 0.0463 |
| Total                       | 0.1529 | 0.0500 |

Attribution of success ability and failure ability have significant indirect effects on learning performance through pedagogy, technology and community mediating effects of online learning environment. Among them, the most important mediating effect is community, which is 0.0702* and 0.0696* respectively. Pedagogy is the second, 0.0589* and 0.0618* respectively. The results in table 10 show that both the success attribution and the failure attribution have a significant indirect impact on learning performance through the mediation of online learning environment, forming a positive prediction. Of the three types of online learning environments, the mediating effect of community is the most significant, followed by pedagogy and technology. This is the learning community characteristics of online learning. Learning behaviors such as knowledge, skills, emotions, attitudes and learning strategies have a significant impact on learning performance.

b. An analysis of the direct and indirect effects of effort attribution on learning performance mediated by online learning environment

Table 11 shows that the direct effects of total effort attribution, success effort attribution and failure effort attribution on learning performance are sig > 0.05, which are not significant.

Successful effort attribution and failure effort attribution have significant indirect effects on learning performance through the pedagogy, technology and community mediating effects of online learning environment. Among them, the most important mediating effect is still community, which is 0.0700* and 0.0541*, respectively. Pedagogy came next, 0.0503* and 0.0432*, respectively. This shows that learners with effort attribution orientation, whether successful or failure attribution, have a significant effect on learning performance through the mediating effect of online learning environment, forming a positive prediction. Of the three types of online learning environments, the mediating effect of community is the most significant, followed by pedagogy and technology.

Total effort attribution has a significant indirect effect on learning performance through the pedagogy mediating effect of online learning environment. Its contribution value cannot be ignored. This extra indirect effect was absent from total ability attributions, suggesting that the indirect effect of online learners’ total effort attributions (regardless of success or failure) on learning performance was stronger than that of total ability attributions.

Table 11 The direct and indirect effects of effort attribution on learning performance

| DIRECT AND INDIRECT EFFECTS | Effect | Sig |
|-----------------------------|--------|-----|
| Total effort attribution    |        |     |
| Direct Pedagogy             | 0.0619*| 0.0403 |
| Technology                  | 0.0228 | 0.0546 |
| Community                   | 0.0803 | 0.0549 |
| Total                       | 0.1650 | 0.0572 |
| Success effort attribution  |        |     |
| Direct Pedagogy             | 0.0503*| 0.0334 |
| Technology                  | 0.0191*| 0.0471 |
| Community                   | 0.0700*| 0.0464 |
| Total                       | 0.1394 | 0.0504 |
| Failure effort attribution  |        |     |
| Direct Pedagogy             | 0.0432*| 0.0308 |
| Technology                  | 0.0185*| 0.0373 |
| Community                   | 0.0541*| 0.0400 |
| Total                       | 0.1159*| 0.0449 |
c. An analysis of the direct and indirect effects of background attribution on learning performance mediated by online learning environment

The results in table 12 show that the direct effects of total background attribution, success background attribution and failure background attribution on learning performance are sig > 0.05, which are not significant.

Total background attribution and failure background attribution have a significant indirect effect on learning performance through the pedagogy, technology and community mediating effect of online learning environment, forming a positive prediction of learning performance. However, the attribution of successful background has a significant indirect effect on learning performance only through the mediating effect of technology factors in online learning environment.

The results can be summarized as: Since failure background attribution is attributed to the difficulty of the course, harsh grading, the bad relationship with teachers, the poor teaching of teachers and other external uncontrollable factors, all the properties of online learning environment can compensate for the above adverse factors (such as the positive correlation mentioned above), which will have a significant effect on their performance and form a positive prediction. However, the success background attribution is less dependent on the online learning environment, only sensitive to technology.

For online learners with external uncontrollable attribution orientation, the community effect is significant, which are 0.0632 * and 0.0446 *, respectively. It shows that the mediating effect of communication, interaction and cooperation in learning environment is significant.

| Table 12 The direct and indirect effects of background attribution on learning performance |
|---------------------------------|--------|--------|--------|
| DIRECT AND INDIRECT EFFECTS     | Effect | Sig    |         |
| Total background attribution     | Direct | 0.1490 | 0.2069 |
|                                 |        | Pedagogy | 0.0569 |
|                                 |        | Technology | 0.0217 |
|                                 |        | Community | 0.0632 |
|                                 |        | Total | 0.1418 |
| Success background attribution   | Direct | 0.1522 | 0.3039 |
|                                 |        | Pedagogy | 0.0700 |
|                                 |        | Technology | 0.0254 |
|                                 |        | Community | 0.0694 |
|                                 |        | Total | 0.1648 |
| Failure background attribution   | Direct | 0.0858 | 0.0991 |
|                                 |        | Pedagogy | 0.0352 |
|                                 |        | Technology | 0.0135 |
|                                 |        | Community | 0.0446 |
|                                 |        | Total | 0.0933 |

Conclusions

In the research, we use the method of online learning environment as the intermediary variable to study the effect of online learners’ attribution on learning performance. The conclusions are as follows:

(1) Luck attribution has no correlation with learning performance and has no effect.

(2) Ability, effort and background attribution have significant positive correlation with learning performance, but the direct effect is not significant. It shows that these attributional characteristics cannot directly predict learning performance, it is consistent with some of the earlier studies (Zhou, Dong, 1994; Chen, Hu, 2008).

(3) The results show that the total ability attribution has no significant effect on learning performance; the total effort attribution has a significant effect on learning performance through the mediating effect of pedagogy; the total background attribution has a significant effect on learning performance through the mediating effect of pedagogy, technology and community. These effects can positively predict learning performance.

(4) The indirect effect of the success ability attribution and failure ability attribution through the mediating effect of online learning environment is significant, forming a positive prediction. The mediating effect of community is the most significant, followed by pedagogy and technology.

(5) The indirect effect of the successful effort attribution and failure effort attribution is significant through the mediating effect of online learning environment, forming a positive prediction. The mediating effect of community is the most significant, followed by pedagogy and technology.
Attribution and ability attribution is more significant, which can better predict learning performance positively. The results of successful attribution confirm this rule.

As an objective attribute of online learning environment, the level of mediating effects of pedagogy, technology and community are community, pedagogy and technology (from strong to weak). Online teaching federals and instructional design professionals should pay more attention to: do not pursue the improvement of online platform technology level in excess, should focus on the level of system community and pedagogy in the online learning environment, both of them form a positive prediction of learning performance through the mediating effect of online learning environment. Both of them play a more important in supporting learning attribution. In fact, on the basis of the research results, it is a long-term and in-depth issue to improve the community and pedagogy of online learning platform.

The effect of failure attribution on learning performance reflects that the mediating effect of online learning environment on learning performance is relatively comprehensive, and online learning environment has widespread significance for improving learning performance. The significance of the effect is the same as mentioned above, and the community is still the most significant.

**Limitations**

The variable design of measurement tools is still relatively rough, especially the online learning environment questionnaire (29 questions) can’t comprehensive and detailed reflect the pedagogy, technology and community of online learning.

The internal dispersion of sample data is large, and the significance level is only limited at 0.05.

The following research should increase the sample size to reflect the general law of online learning more comprehensively.

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