Research Paper

Designing the Curriculum of Virtual Schools in the Second Period of Secondary School (Khaf City - Razavi Khorasan)

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Abstract

There are many factors that entail avoiding going to physical schools. Then virtual schooling is a challenge nowadays. To respond to 'What is the curriculum of virtual schools in the second period of secondary school?' in a mixed exploratory method in this study, the validity and reliability of coding were verified via credibility, dependability, confirmability and transferability criteria. The questionnaire validity was approved by the experts and its reliability by Cronbach's α of 0.70. The questionnaire was given to 152 high school participant teachers in Khaf. The validity and reliability of the curriculum content, evaluation, learning-teaching flows, presentation strategies, and suitability was verified by factor loading (above 0.50) and significance level (above 1.96); the virtual curriculum components' coefficient of determination, predictive power of the model, and Goodness of Fit were acceptable. The findings imply the development of an in-depth hardware and software for the required virtual infrastructure across the country.

Keywords: Virtual schools, curriculum design, diverse evaluation, virtual education, interaction.

Introduction

Undoubtedly, the education system has a relationship with its time. If in the not-so-distant past, teachers and textbooks played an essential role in education, today, considering the virtual space, especially social networks, the

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forms of education need to be seriously reviewed. The old form of education and training means that it is not possible to educate students as in the past, with the teacher, curriculum and classroom atmosphere as the focus, but its form has changed. Virtual space and especially social networks have more possibilities than limitations. The education and training system should not see it as a threat, but should change its forms of education and training (Fallah et al., 2012; Rezapour & Moharramzadeh, 2021).

The main issue in today's education is not access to more information. In fact, one of the challenges of students is to give meaning to the amount of content they are faced with and to absorb all the information in a targeted manner. Because of the explosion of information and the accompanying developments in communication, we need new approaches (Ambrose et al., 2010; Butcher, 2020). In the classroom, teachers try to participate and interact with students and with activities such as question and answer, encouraging students to think, feedback information to students, research and individual and group projects, creating an environment for discussion and exchange of opinions, seminars and the like and create an interactive environment. In the e-learning environment, there is also a need to create an interactive environment between students and teachers, and this will not be achieved unless social network services are used in the e-learning management system

of schools. These services will effectively increase the interaction between students, teachers and administrators of the country's schools (Nam et al., 2020; Rodrigues et al., 2011; Saqlain, 2018). Among the courses that exist in the academic curriculums, math course is of particular importance in life, because it provides students with the right way of thinking, intellectual and practical order, the ability to solve everyday problems, research procedures, and continuing education at higher levels makes it possible (McBean, 2018; Sharafi, 2021). For this reason, the use of information technology in mathematics education has been given special attention and many benefits of its use in facilitating the teaching-learning of mathematics have been mentioned in the research literature. In fact, new technologies help to improve the educational system of schools by providing suitable opportunities for students' personal talents and interests (Jaroslawska et al., 2016; Yazdani, 2019). Considering the importance of information and communication technology and its important role in virtual schools, designing a suitable curriculum model for virtual schools is important and necessary. Many educational institutions decided to pay attention to the expansion of advanced scientific infrastructures and to strengthen the field of growth and creativity in students, instead of spending a lot of money on the construction, maintenance and repair of educational spaces, which in itself significantly saves money.

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Literature Review

The virtual school is not limited by time, and the student and the teacher can communicate with each other at the same time or through e-mail at any time of the day or night. Software in a virtual school can ensure an active education without the teacher and student seeing each other. Gifted and late learning students can benefit from the education of this school according to their ability and talent and receive individual education according to their abilities (Kennedy et al., 2013; Richardson et al., 2015).

A virtual classroom is a classroom that is held electronically and based on information technology technologies. Today, the expansion of the Internet and the possibility of sending live video on the Internet has made it possible to hold classes online and virtually. Virtual classroom is similar to physical classroom in many components (Kennedy et al., 2013; Rhodes et al., 2019).

In order to realize virtual education, it is necessary to evaluate various aspects of preparation in terms of technical infrastructure, political preparation, human resource preparation, and organizational preparation. The general framework of this evaluation is divided into three main parts, which include: Hard preparation, soft preparation, support preparation, monitoring and coordination (Kumar, 2018; Samioglu & Siniksaran, 2016).

Rezapour and Moharramzadeh (2021) conducted a research titled "Efficiency model of virtual training program for physical education in schools" (case study: Covid-19 pandemic). The research method was qualitative and based on foundation data theorizing. The findings of this research can be used as a model for the effective compilation of the virtual educational program of physical education lessons in schools (Rezapour & Moharramzadeh, 2021).

Alipour et al. (2021) designed the model of components affecting the quality of electronic learning environments. The research approach is qualitative using content analysis. To achieve the above explanation, the method of synthesis was used. To check the validity and reliability of coding, the reliability included four criteria of credibility (the degree of belief in the research findings), dependability (the ability to identify where the data of a certain study came from) and confirmability (the findings are actually and really based on data) and transferability (the results of a qualitative study can be transferred to another different environment) were used (Alipour et al., 2021).

Rezapour et al. (2021) developed a model of the effectiveness of the physical training virtual education plan in schools (case study: the epidemic of Covid-19). The results showed that according to management requirements (planning, creativity, motivation, monitoring, feedback, evaluation), attitude requirements (society, family, and student attitude), support requirements

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(supports of teachers, schools, families, Ministries of Education, sports design experts) can be a model of efficiency for the virtual educational plan of physical education of schools in critical conditions such as the epidemic of Covid-19 (Rezapour & Moharramzadeh, 2021).

Aslan et al. (2021), investigated the opinions of teachers regarding middle school curriculum for distance learning during the COVID-19 pandemic. Another important finding was that teachers only use assignments, end-of-unit tests, and participation in online courses as assessment tools and agree that they are unable to implement reliable and valid assessment tools. Limitations of the study and implications for future research are discussed later.

Research Questions

1. What is the curriculum of virtual schools in the second period of secondary school?
2. What are the objectives of the curriculum of virtual schools in the second period of high school?
3. What are the characteristics of the curriculum components (content, evaluation, teaching-learning flows) of virtual schools in the second period of high school?
4. What are the strategies for presenting the curriculum of virtual schools in the second period of high school?
5. What is the degree of suitability of the curriculum of virtual schools in the second period of high school?

Methodology

Research method based on its goal was fundamental-applied upon to the type of data, mixed (qualitative-quantitative) exploratory type; for the time of data collection, cross-sectional; and for the method of data collection or the nature and method of the research, descriptive-survey. The reasons that led to the choice of (combined) research method, rather than quantitative research, were as follows: The purpose of this research was to design the curriculum of virtual schools in the second period of secondary school (Khaf city - Razavi Khorasan) which could improve the quantitative level in the educational system and make the quality of student education effective. The statistical population in the quantitative stage was considered to be all male and female teachers of the upper level of secondary schools in Khaf city. Therefore, first, by referring to the Department of Education of Khaf city, it was determined that 260 male and female teachers were working in their upper secondary schools, of which 143 were male and 117 were female. To select a number of participants from the whole population in question (260) and referring to Morgan's sample size estimation table, the number of participants in the quantitative section was 152 subjects to whom the compiled questionnaire was distributed. Also, the results of the KMO test showed that this volume of the sample is sufficient to perform statistical tests such as

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exploratory factor analysis. After extracting the concepts and categories, we needed to quantitatively estimate and evaluate the concepts to see how much the extracted components were confirmed, who were one of the main beneficiaries of the curriculum in the field of virtual schools. For this part convenient sampling was carried out through access to the names in the list of the respondents.

The data collection was made via library and field. Regarding the collection of information related to the literature and the research background, library-documentary method was used, and the field method was used to collect information for confirming or rejecting the research hypotheses. In the current research, library studies such as articles and Latin and Persian books, statistics, and information were used in order to collect information for the foundation of the general basics of the research such as definition, factors, dimensions, necessities, and theories. In the quantitative section, a five-point Likert scale was used to collect participants' attitudes "very much, a lot, to some extent, little, very little" toward the questionnaire items + the questionnaires and their results in Appendices A, B, C …

 Cronbach's alpha was used to measure the reliability of the data collection tool. Cronbach's alpha coefficient was invented by Cronbach in 1951 and is one of the most common methods of measuring the dependability or reliability of questionnaires.

Cronbach's alpha coefficient is used to measure the one-dimensionality of attitudes, judgments, opinions and other categories that are not easy to measure. In fact, we want to see to what extent the respondents' understanding of the questions was the same. The basis of Cronbach's alpha coefficient is also the basis of spectra or scales. To check the content validity of the measurement tool of this research, the questionnaire was made available to the experts and finally it was approved by them, and Cronbach's alpha of 0.70 was obtained which confirms the reliability of this tool. (evidence of Cronbach's alphas)

Research Findings:

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To investigate the relationship between a sustainable university and its dimensions with the knowledge-based economy in Islamic Azad universities of Mazandaran province, we use correlation analysis, the table below shows the results of this analysis. As we know, the main purpose of this study is to present a model of the impact of factors affecting a sustainable university on the development of factors affecting the knowledge-based economy in the

free In response to the question 'What are the contents of the curriculum of virtual schools in the second period of high school?', the findings related to the content of the curriculum of virtual schools in the second period of secondary school showed that a total of 198 open codes or initial concepts were extracted from the
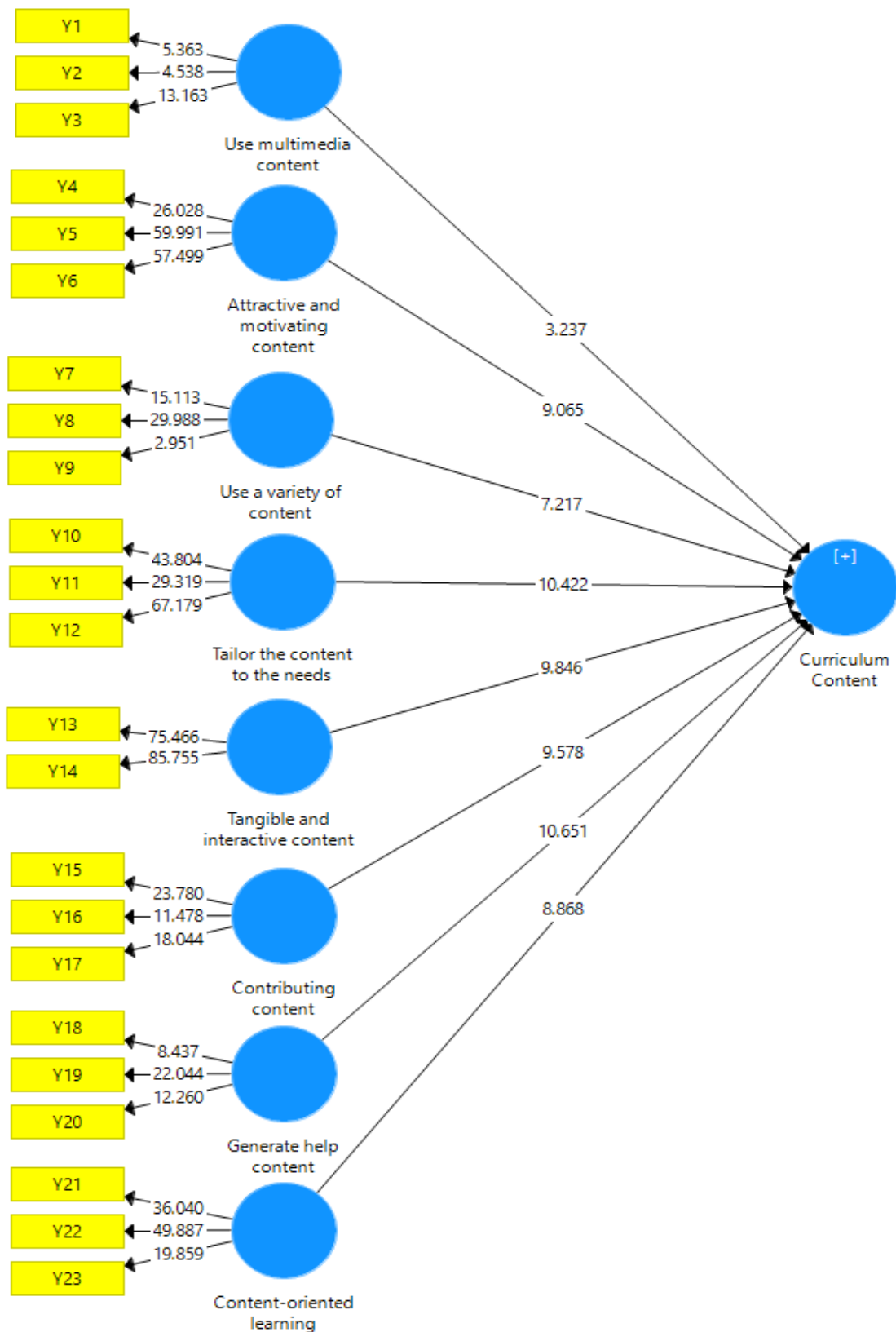
Figure 1. Results of confirmatory factor analysis of research constructs of content of virtual school curriculum (significance mode)
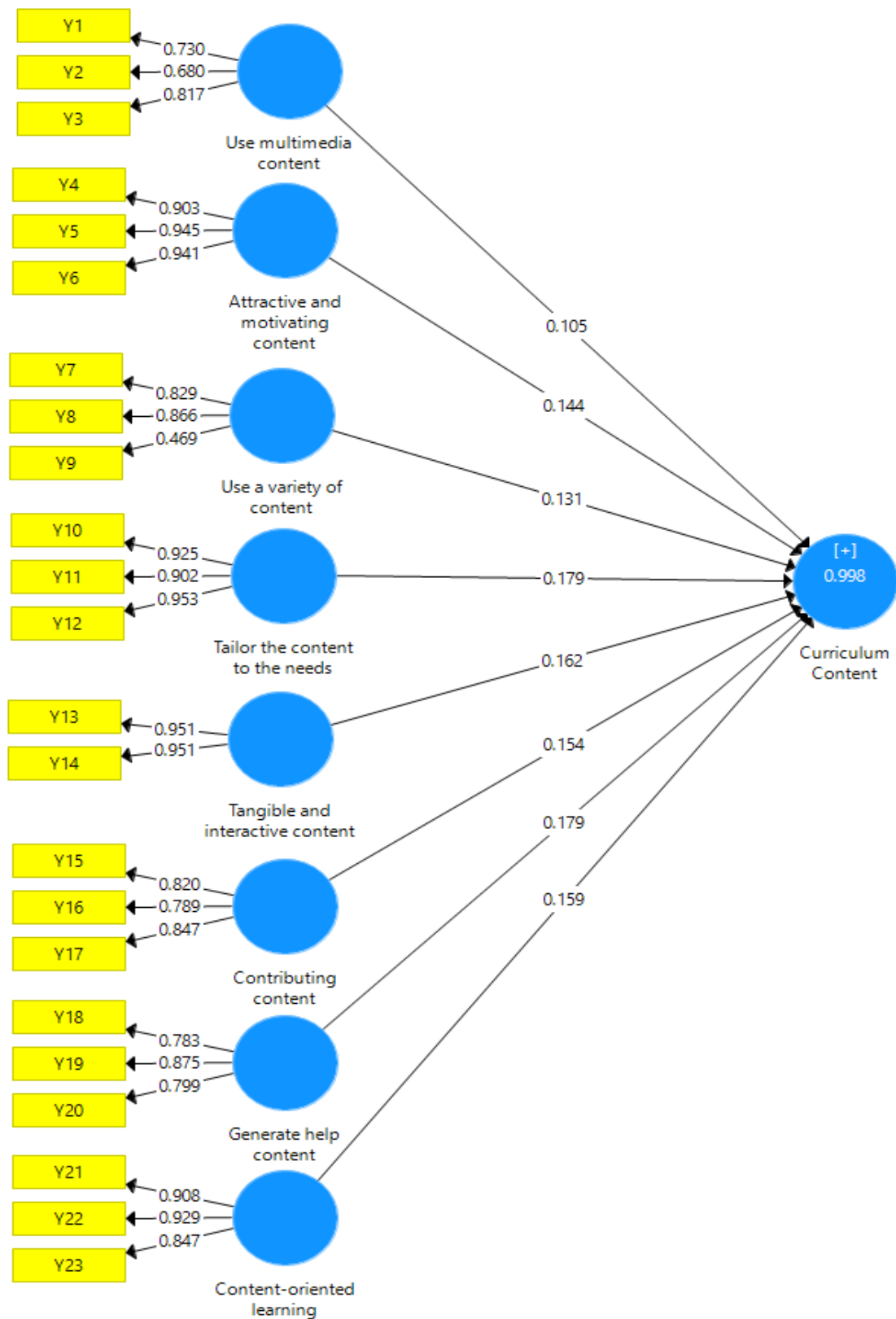
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Figure 2. Results of confirmatory factor analysis of research constructs of content of virtual school curriculum (standard mode)

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interviews, which after merging 43 central codes and 11 optional codes or main categories were obtained, the main categories were from: The use of multimedia content, the attractiveness and motivation of the content, the use of diverse content, the design of content according to the needs, the tangible content, the production of technological content, the production of collaborative content, the production of guide content, the importance of audio-visual content, experiential evaluation, and content-oriented learning. Also, the results related to the findings of the qualitative part related to the content of the curriculum of virtual schools in the second period of high school showed that the components of using multimedia content; attractive and motivating content; diverse content; matching content with needs; concrete content; and interactive, collaborative content; production of guide content; and learning-oriented content all had a factor loading above 0.50 and a significance level above 1.96, items which exactly measured the variables predicted in the virtual school curriculum content questionnaire, e.g. Curriculum Content Questionnaire year in the second period of high school, so their validity was of high level and the value of R^2 (coefficient of determination) was 0.781, the value of Q^2 (the predictive power of the model), 0.672, and that of GOF (goodness of fit), 0.699, suitable and desirable in the second period of high school. The findings related to the content of the curriculum of virtual schools in the second period of high school were aligned and consistent with the findings of Rezaei Rad's at al. (2012), Montgomery at al. (2020) and Butcher (2020).

To address the question 'What are the curriculum evaluations of virtual schools in the second period of high school?', all of them had a factor load above 0.50 and a significance level above 1.96, which means that the items exactly measured the variables predicted in the virtual school curriculum evaluation questionnaire in the second period of high school, so they had a high level of validity. And the value of R^2 was 0.693, that of Q2, 0.484, and that of GOF, 0.529. This was suitable and desirable in the second period of high school. The findings related to the evaluation of the curriculum of virtual schools in the second period of high school are aligned and compatible with the findings of Ramezani at al. (2019), Moradi et al. (2016), Cortez (2020) and that of Alade and Yisa (2019).

In answering the query 'What are the learning-teaching streams of the virtual school curriculum in the second period of high school?', the results related to the findings of the qualitative part concerning the learning-teaching flows of the virtual school curriculum in the second period of high school showed that the components of diversifying the teaching method, learning interactively and collaboratively, using the environment and various educational tools, having skill and recognition of the learner, playing teacher's role as a guide in learning, need-based teaching, and designing learning activities all had a factor load above 0.50 and a significance level above 1.96, upon which the items were exactly the predicted variables in the curriculum learning-teaching flows questionnaire. Virtual schools were measured in the second period of high school, so they had a high level of validity and their value of R^2 was 0.723, that of Q^2, 0.607, and that of GOF, 0.592. Teaching the curriculum of virtual schools in the second period of high school seemed suitable and desirable. The findings related to the learning-teaching processes of the virtual school curriculum in the second year of high school were aligned and consistent with the findings of Yazdani (2019), Mishra et al. (2020) and Beard (2020).
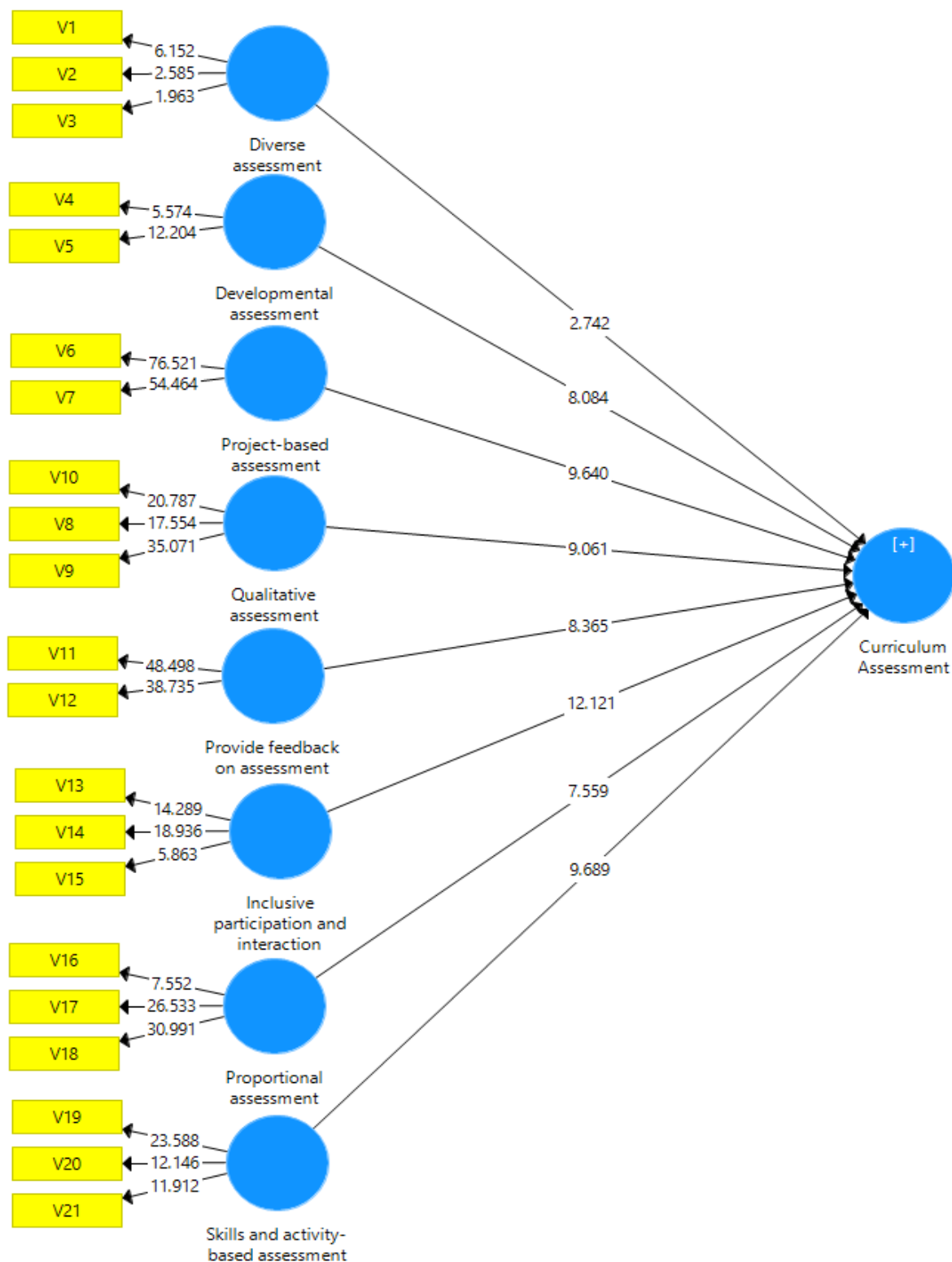
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Figure 1. Results of confirmatory factor analysis of the research constructs of evaluation in virtual school curriculum (significance mode)
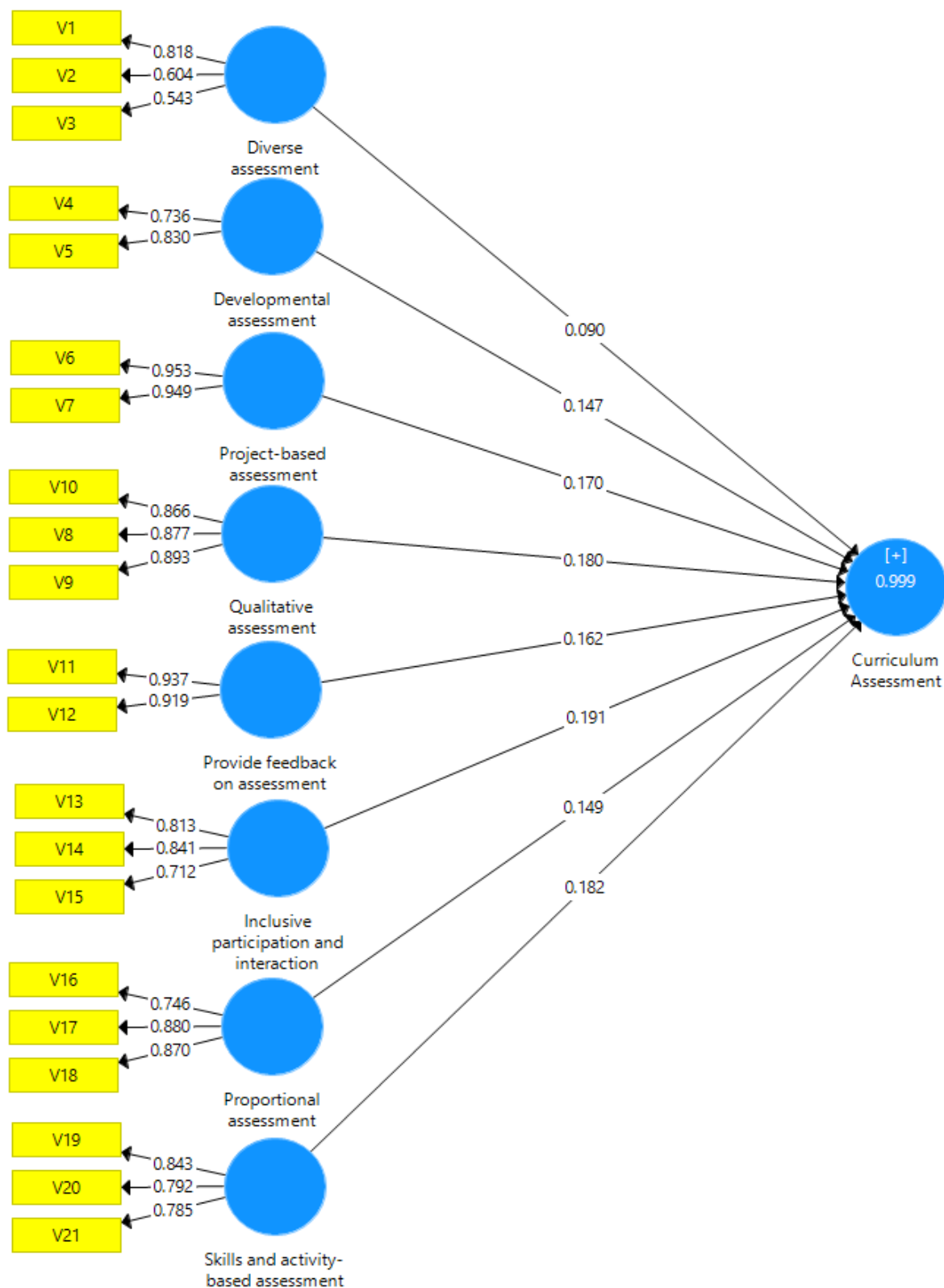
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Figure 2. **Results of confirmatory factor analysis of the research constructs of evaluation in virtual school curriculum (standard mode)**

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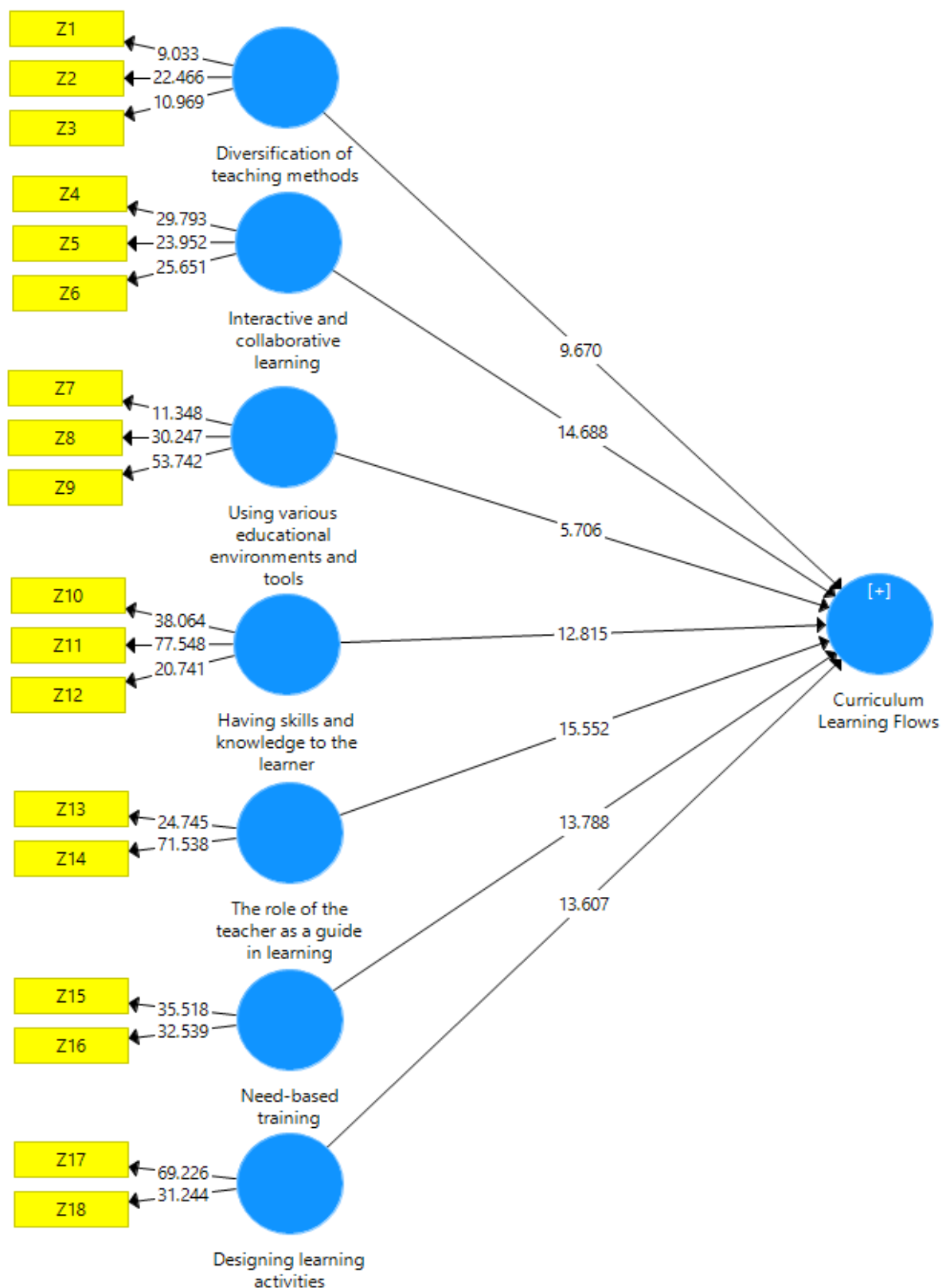
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Figure 3. Results of confirmatory factor analysis of the research constructs of the learning-teaching flows of virtual school curriculum (significance mode)

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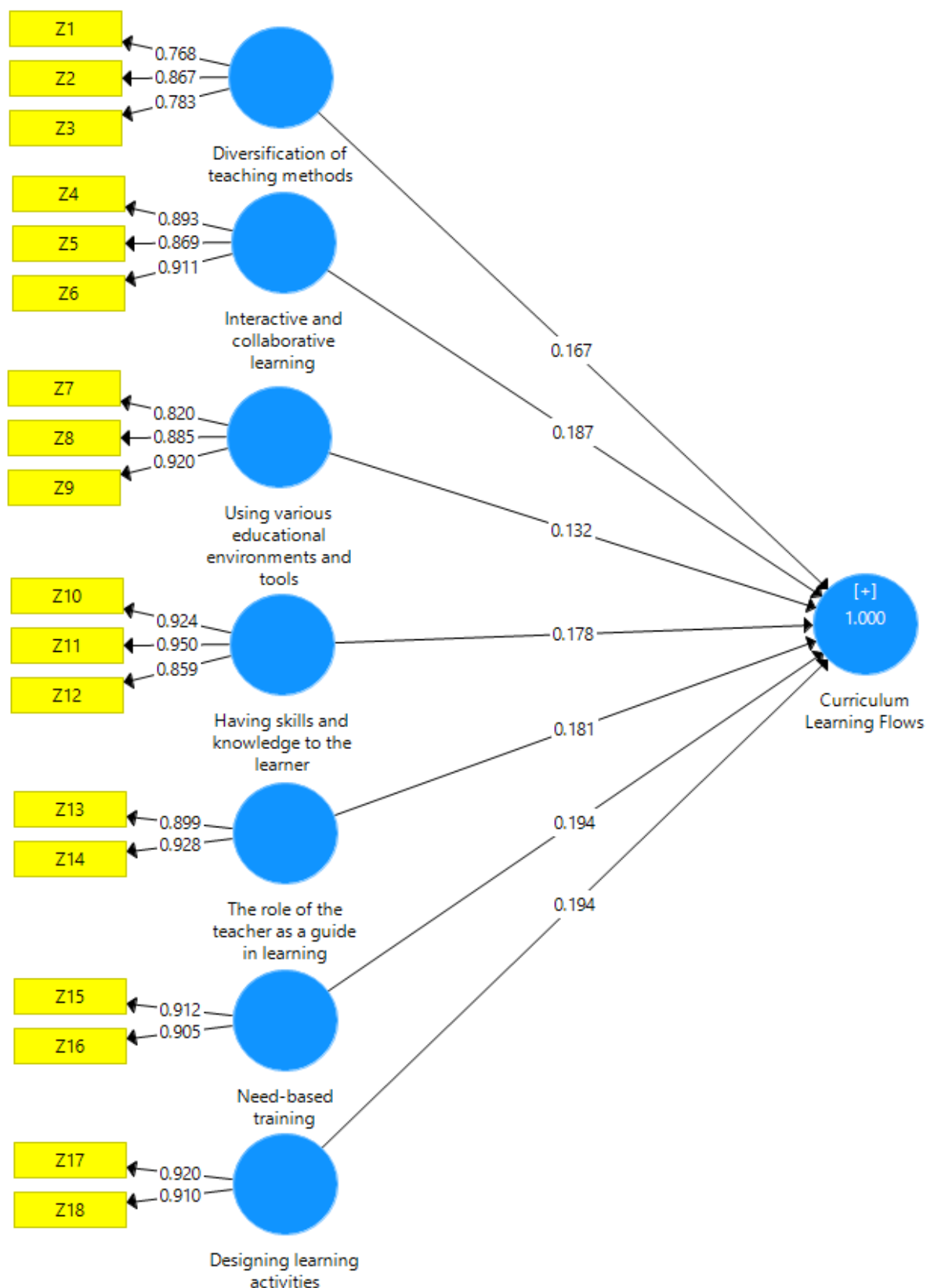
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Figure 4. Results of confirmatory factor analysis of the research constructs of the learning-teaching flows of virtual school curriculum (standard mode)

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Figure 5. Results of confirmatory factor analysis of the research constructs of virtual school curriculum strategies (significance mode)
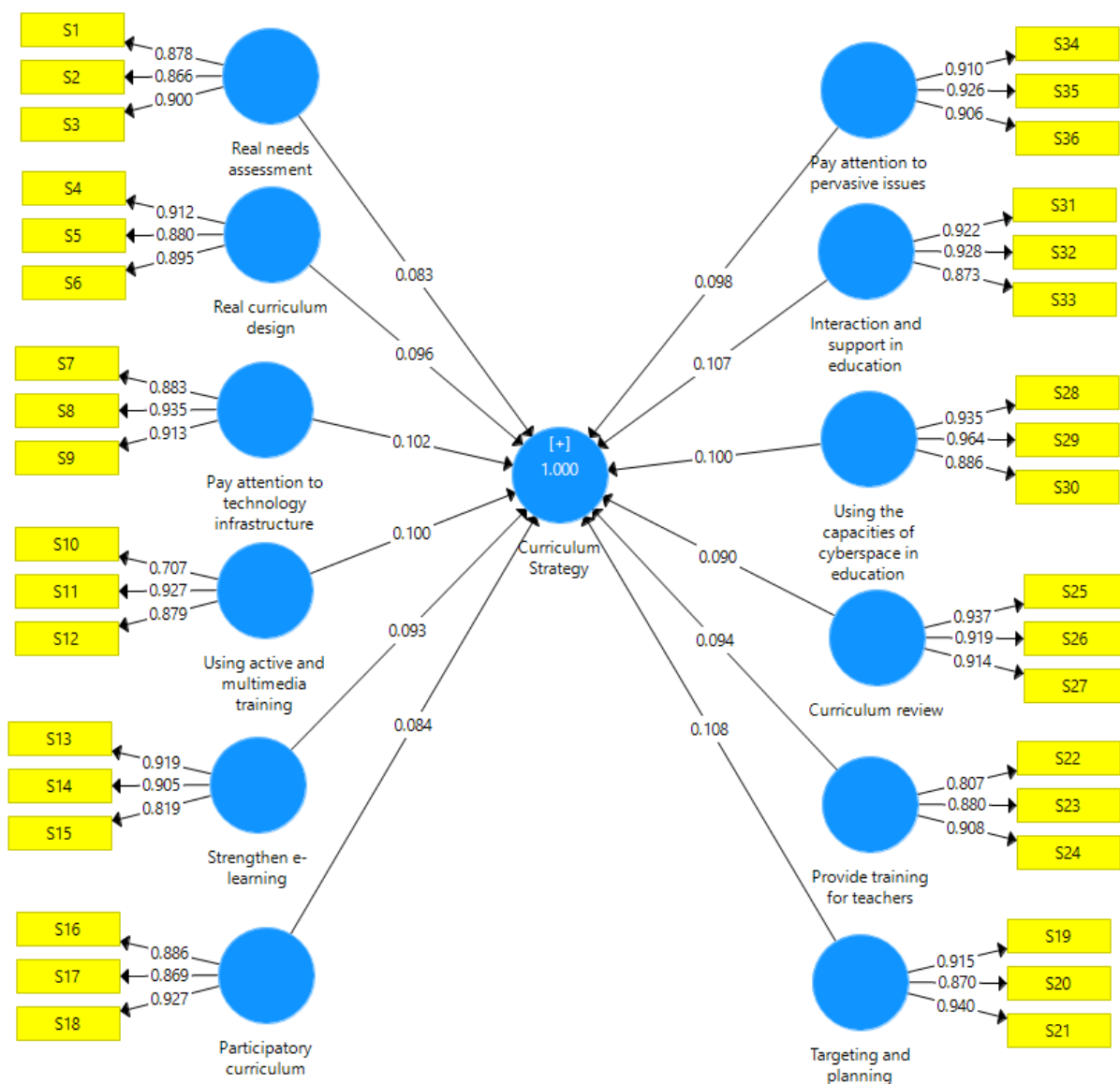
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Figure 6. Results of confirmatory factor analysis of the research constructs of virtual school curriculum strategies (standard mode)

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Regarding 'what are the <u>strategies</u> for resenting the curriculum of virtual schools in the second period of high school?', the results related to the findings of the qualitative part pertaining the strategies of presenting the curriculum of virtual schools in the second period of secondary school showed that the components of real needs assessment, real curriculum design, attention to technological infrastructure, use of active and multimedia training, strength of virtual education, collaborative curriculum, targeting and planning, provision of training for teachers, revision of the curriculum, use of the capabilities of virtual space in education, interaction and support in education, and attention to inclusive issues all had a factor load above 0.50 and significance level was above 1.96, which means that the items exactly measured the predicted variables in the virtual school curriculum delivery strategies questionnaire in the second period of high school, so they had a high level of validity. And the value of R^2 was 0.805, that of Q^2, 0.564, and that of GOF, 0.613 in the second period of high school. Then it was suitable and desirable. The findings related to the strategies of presenting the curriculum of virtual schools in the second period of high school were aligned and compatible with the findings of Beard (2020), Cavanaugh et al. (2019), Mary F. Rice (2018), and Miron et al. (2016).

As to 'What is the degree of suitability of the curriculum of virtual schools in the second period of high school?', the results related to the findings of the qualitative part concerning the degree of appropriateness of the curriculum of virtual schools in the second period of high school showed that the components of the curriculum's purposefulness, evaluation according to the content, use of various teaching methods, importance of the presence and familiarity

of teacher, importance of comprehensive knowledge characteristics, importance of environment and time, attention to diverse educational infrastructures, curriculum design and management, and compatibility of curriculum components all had a factor load above 0.50 and a significance level above 1.96, where the items exactly predicted the variables in the degree of appropriateness questionnaire. The curriculum of virtual schools was measured in the second period of secondary school, so they had a high level of validity. The value of R^2 was 0.758, that of Q^2, 0.664 and that of GOF, 0.621. Virtual school in the second period of high school was seen as suitable and desirable. The findings related to the degree of appropriateness of the curriculum of virtual schools in the second year of high school were consistent with the findings of Ekareva et al. (2016) and Hsu et al. (2016).

The content validity of the research questionnaire was approved by the experts, and Cronbach's alpha evidenced the reliability of the questionnaire (.70), as approved the reliability of data collection. The whole questionnaire content of the curriculum of virtual schools, that is all central and optional codes or initial concepts, had acceptable factor loading (above 0.50)//; hence the questionnaire content had high level of validity and exactly measured the pertaining variable because its difference was significant as its observed α was above the critical α (1.96). The coefficient of determination ($R^2 = 0.781$), predictive power of the model ($Q^2 = 0.672$), and Goodness of Fit (GOF = 0.699) for the content of the questionnaire were all suitable and desirable. The same went for curriculum evaluation of the questionnaire (factor load above 0.50, α above the critical α, $R^2 = 0.693$, $Q^2 = 0.484$, and GOF = 0.529), the questionnaire items related to learning-teaching flows (factor load > 0.50 and α > the critical α, $R^2 = 0.723$, $Q^2 = 0.607$, and GOF = 0.592), the questionnaire items pertaining to the strategies of presenting the curriculum (factor load above 0.50, α > 1.96, $R^2 = 0.805$; $Q^2 =$
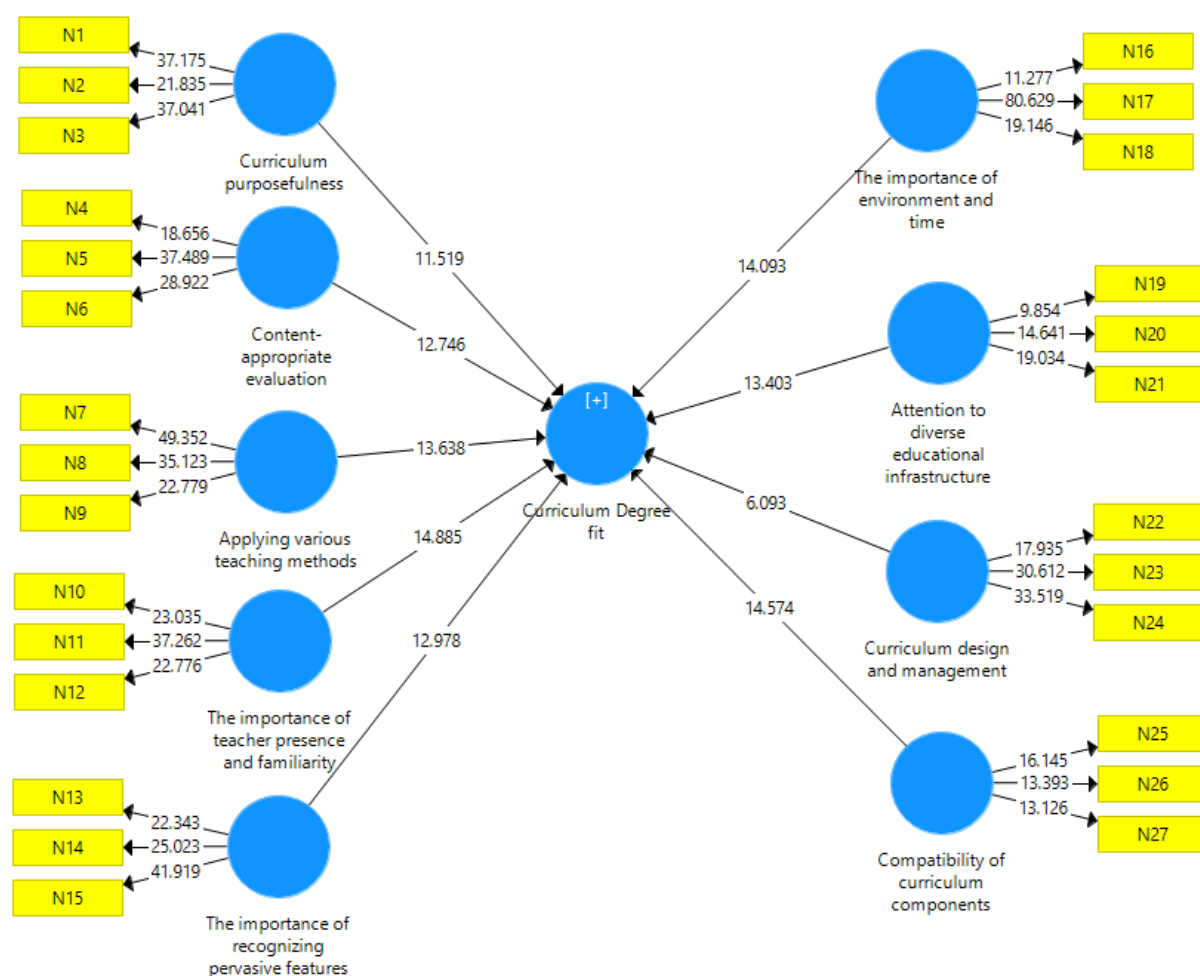
Figure 7. Results of confirmatory factor analysis of the research constructs of degree of suitability of the curriculum of virtual schools (significance mode)
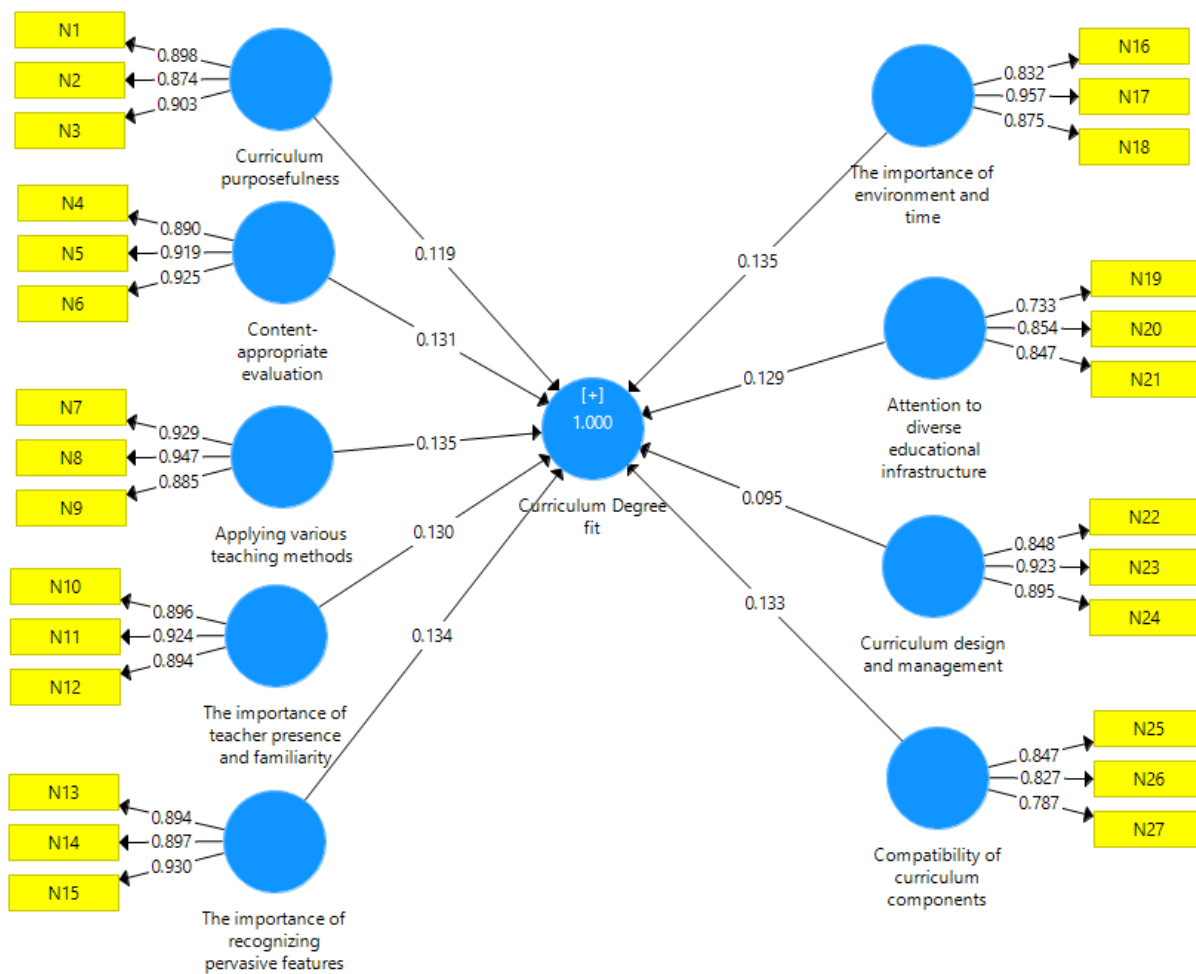
Figure 8. Results of confirmatory factor analysis of the research constructs of degree of suitability of the curriculum of virtual schools (standard mode)

0.564; and GOF = 0.613) and the degree of suitability of the curriculum of virtual schools (factor load above 0.50, $\alpha > 1.96$, $R^2 = 0.758$, $Q^2 = 0.664$, and GOF = 0.621).

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Discussion and Conclusion

The challenges created in most countries during the prevalence of corona virus or other contagious diseases, plus other reasons such as pollution and extremely cold weather have led to the closure of educational centers from basic to higher levels, and esp. here at the upper level (final three years) of secondary school. To compensate for such educational losses owing to missing physical classes, and to save spending long hours in, and expensive charges for, heavy traffic in mega cities and long ways of remote places, virtual school has become a technology-assisting necessity for educating our learners in this era of digital communication and interaction. Therefore, what has been reported in the present research was the results of examining the curriculum model of virtual schools in the second period of secondary school in Khaf city (Khorasan Razavi province) by identifying its influential components in the design of such virtual school curriculum by reference to experts in the science of education. Then use of virtual education and electronic learning mechanism seem to have been the only practical option and the best solution so far to avoid discontinuation of formal education, educational activities, skill learning, and professional teaching.

Therefore, using the Department of Education of Khaf city, 260 teachers of upper secondary schools (last three years of high school) were sampled conveniently, from which 152 participants were selected upon Morgan's sample size estimation table in a mixed (qualitative-quantitative) exploratory type of research. Then the reliable valid questionnaire—as mentioned in the discussion section—was distributed to these participants. Also, the results of the KMO test showed that this sample size is sufficient to perform statistical tests such as exploratory factor analysis. Library-documentary method was used for data collection. After extracting the concepts and categories, we needed to quantitatively estimate and evaluate the concepts to see how much of the extracted components were confirmed. The validity and reliability of content analysis and coding were checked using credibility, dependability, confirmability, and transferability criteria for the results of the qualitative part of the study. In the quantitative section, a five-point Likert scale was used to collect the participant teachers' attitudes, 'very much (5), a lot (4), to some extent (3), little (2), very little (1)' toward the questionnaire items. In effect, the validity and reliability of the questionnaire was evidenced by verifying the validity and reliability of its main components, namely questionnaire content, curriculum evaluation, teaching-learning flows, strategies of presenting the curriculum, and suitability of the curriculum of virtual classes due to exactly

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measuring the predicted variables, showing high validity for the components, and being suitable and desirable based on the coefficient of determination, predictive power of the model, and goodness of fit. The content validity of the research questionnaire was approved by the experts, and its Cronbach's alpha was 0.70, approving its reliability. Of the whole contents of the curriculum of virtual schools, 43 central codes and 11 optional codes including the components of using multimedia content; attractive and motivating content; etc. were obtained as valid and reliable. The components of diversifying the teaching method, learning interactively and collaboratively, etc. were also evaluated as valid and reliable component of teaching-learning flow. The curriculum delivery strategies questionnaire that tested the presentation of the curriculum of virtual schools showed that the components of real needs assessment, real curriculum design, etc. were estimated as valid and reliable. On the degree of appropriateness of the questionnaire items, as the components of suitability of the curriculum of virtual schools; the curriculum's purposefulness, evaluation according to the content, etc. were verified as valid and reliable in their function. Then on the whole the questionnaire was a valid and reliable instrument for evidencing the curriculum of virtual school as valid and reliable.

As virtual education assists in education equity for the public, weather in expensive crowded cities or in far remote places and villages, development of the required digital infrastructure and providing public access to virtual curriculum and its ensuing flexibilities for online schools is the real implication of this study to be brought to bear by the ministries of education and higher education, as the adoption of virtual education has the capacity to enable educational institutions to be more flexible and agile and have the ability to respond faster to changes with more cost-effective methods. Needless to say, any change will have its advantages and disadvantages and virtual schools is not an exception to the rule. Therefore, it is expected that with proper planning and providing the necessary infrastructure for a virtual school, we could see appropriate changes at the community level, considering the possibility of maximum use of smart and virtual systems. To meet the needs of communities to use them for public education at all levels, virtual schools can be a good option to realize the education for everyone at the lowest cost and dramatically reduce the need of the governments to construct, maintain, and restore school buildings. Despite the problems of virtual space, it helps the families reduce to a minimum or zero the costs and risks of their children going back and forth to physical schools. Despite the difficulties of presenting lessons in the virtual space and providing different and appropriate contents, teachers solve the problems of

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continuous attendance in the class and ongoing expenses. It is hoped that by reducing cyberspace problems, we can expand the scope of education and continue education at all levels for all parts of the world, especially in our country. Then development of such infrastructure throughout the country could be the new challenge to address by future research.

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