Are Data Collection Tools for TPACK Suitable?

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Abstract—Despite a lot of studies existing in the literature about TPACK, it is still not obvious how to do TPACK measurement. However, when the studies investigating measurements are reviewed, it is seen that measurements are considered in informational aspect, and applications are held in only TK aspect or limited in TPC and TCK components. In this study, it is aimed to examine the differences and relationships between measurement instruments by focusing on TPACK measurements. Another goal of the study is to give an insight on how TPACK measurements should be realized. In the research, 213 teachers from different fields working in Turkey have participated and study is designed in Descriptive Survey Model. Three different tools were used in order to collect data. The results showed a meaningful relationship between individuals' statements tools, but no meaningful relationship between individuals' statements and performance tools. As a result of the study, many measurement instruments which measure participants' TPACK measurements have been concluded that they do not actually measure TPACK. Apart from that, it has been found out that the teachers have difficulty in providing technology integration in education and the most important reason of this situation is that the teachers cannot manage to put technological knowledge content into practice.

Index Terms—Data collection, technology integration in education, technology literacy, TPACK.

I. INTRODUCTION

In education, technology integration is a complex process which involves a lot of elements and models which define those processes are reached through related literature [1], [2], [3]. One of those models which was developed to provide technology integration is called Technological Pedagogical and Content Knowledge (TPACK) [2]. The components of TPACK are technological knowledge (TK), pedagogical knowledge (PK) and content knowledge (CK). Despite a lot of studies existing in the literature about TPACK, it is still not obvious how to do TPACK measurement [3], [4]. However, when the studies investigating measurements are reviewed, it is seen that measurements are considered in informational aspect, and applications are held in only TK aspect or limited in TPC and TCK components. In addition to that, in almost every study it is striking that data have been examined in terms of variables, such as belief, attitude, perception etc. Furthermore, data relating to those variables have been gathered through data gathering instruments which are generally based on participants' statements. Unlike these study types, in order to provide technology integration in education in depth, it is required to involve all complements and variables and also measurements should be intended to application/performance [5]. However, no studies conducted in this method have been reached in the related literature. In this study, it is aimed to examine the differences and relationships between measurement instruments by focusing on TPACK measurements. Another goal of the study is to give an insight on how TPACK measurements should be realized.

II. METHOD

In the research, 213 teachers from different fields working in Turkey have participated and study is designed in Descriptive Survey Model. In order to collect data, a TPACK Scale (TPACKS)[6], TPACK Survey (TPACK-S) [7] and Technology Integration on Instruction Exam (TIIE), which was developed by the researcher, were used in the study. TPACKS is composed of four and TPACK Survey is composed of eight sub-factors. Since the sub-factors are not the same, TPACKS has been used in one dimension whereas only the sub-branches PCK, TCK and TPK of TPACK Survey were used for the study (Other factors of TPACK Survey have not been used since they treat the factors in one dimension or if the factors have mathematics content). The first two instruments have been applied to the participants at one-week intervals and TIIE lasting 30 minutes has been held at the third week.

III. FINDINGS & CONCLUSION

Correlation Analysis has been executed to examine the relationship between three data gathering instruments, and as can be seen in the Table 1, the result of the analysis has put forward a meaningful relationship between TPACKS-PCK ($r=0.85$, $p=0.00$), TPACKS-TCK ($r=0.89$, $p=0.00$), TPACKS-TPK ($r=0.14$, $p=0.04$),and TCK-TIIE ($r=0.40$, $p=0.00$). However, no meaningful relationship has been found between TPACKS-TIIE ($r=0.05$, $p=0.48$), PCK-TIIE ($r=0.06$, $p=0.44$) and TPK-TIIE ($r=0.10$, $p=0.14$).

Table 1.Correlation analysis results among data collection tools.

	TPACKS		TIEE	
	r	p	r	p
PCK	0.85	0.00	0.06	0.44
TCK	0.89	0.00	0.40	0.00
TPK	0.14	0.04	0.10	0.14
TIEE	0.05	0.48	-	

Although all the measurement instruments are in different structure and measure different themes, it has been highlighting to observe that there has existed no meaningful relationship between especially TIEE and other measurement instruments except TCK. This difference has been considered as relating to the structure of the measurement instruments (Although the measurement instruments, except TIEE, are based on individuals' statements, TIEE is an exam which reveals performance). Although the first two measurement instruments which are considered as scales are stated to measure the participants' TPACK scores, it is thought that the first two measurement instruments measure TPACK perception. In other words, even though the participants feel themselves qualified within the scope of TPACK, it has revealed that the participants' performance oriented to practice has been found insufficient. The finding coincides with the findings in many studies in the literature [8], [9], [10], [11]. When PCK (x=16.06, sd=3.49), TCK (x=13.79, sd=1.68), and TPK (x=20.69, sd=3.76) scores have been analyzed, it has been noticed that the lowest score belonged to TCK. In addition to that, it is also noteworthy that there has been a meaningful relationship between TCK-TIEE. In the light of these two findings, it has been considered that teachers go through some difficulties in providing technology integration in education and the most significant difficulty they experience is technological content knowledge. As a result of the study, many measurement instruments which measure participants' TPACK measurements have been concluded that they do not actually measure TPACK, they measure participants' perceptions towards the concept of TPACK. Apart from that, it has been found out that the teachers have difficulty in providing technology integration in education and the most important reason of this situation is that the teachers can not manage to put technological knowledge content into practice. It is suggested that in further studies measurement instruments oriented to practices should be developed and appropriate content, which would provide technology integration in education, should be developed and used in teacher education.

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