**Survey instrument**

*ICT use frequency and ICT literacy skills* were adapted from the computer literacy survey at the OECD

Programme for International Student Assessment (Park et al., 2010). ICT literacy included three categories:

a) information collection (program search, CD creation, file transfer, Internet search, file downloading), b)

information processing and creation (editing digital and graphic images, spreadsheet use, creation of power point presentation, multimedia, and web pages) and c) information communication (online chatting, file attachment).

*Learning attitude* refers to abilities related to study methods used in the learning process. The six items included are related to perceptions about student abilities to elaborate, organize, map, and employ effective study methods, to reflect their study processes, and to self-evaluate. According to Park et al. (2010), the validity and reliability of the survey instrument were validated (alpha = .83). *Self-efficacy* was measured using six items of three sub constructs (alpha = .86): intrinsic motivation toward learning, self-efficacy, and autonomous learning (Park et al., 2010). *Weekly study time* was measured by summing the regular class time, the afterschool participation time, the private tutoring time, and the self-study time for mathematics.

*Online teaching and learning support* were examined by calculating the use of education-related web sites. The monthly numbers for using online learning materials and video materials were also examined.

*Average family incom*e was collected, and *Average teacher education level* was measured. *Teachers’ education improvement efforts* were measured by summing the annual participation numbers for class demonstrations, peertutors teaching observations, teaching improvement committees, teaching consulting clinic services, and teachercommunity participation. *Teachers’ creative teaching effort* was measured with two items that asked teachers’perception about the teaching environment, whether it was a good atmosphere for student creativity or anunpleasant atmosphere.

*Principal leadership* was measured using three items that examined teachers’

perceptions about whether principals were willing to share the school's visions with the teacher, allow teachers to participate in decision making processes, and properly conduct teacher evaluations.

*Mathematic achievement* was measured using data from the 2010 National Test Scores.jj