IMPLEMENTING OF INFORMATION AND COMUNICATION TECHNOLOGY INTO ISLAMIC RELIGIOUS EDUCATION TEACHER AT SMP NEGERI 3 TELUKNAGA

Sri Rosmalina Soejono*[1], Iswadi[2], Nur Indah Yusari[3]
[1]*Manajemen Informasi Kesehatan (D4), Universitas Esa Unggul, Jakarta, Indonesia*
[2,3]*Ilmu Komunikasi, Universitas Esa Unggul, Jakarta, Indonesia*

* Corresponding Author: *sri.rosmalina@esaunggul.ac.id*

A B S T R A K

Pengintegrasian Teknologi Informasi dan Komunikasi (TIK) dalam pembelajaran memiliki peran yang sangat penting dalam menghadapi tuntutan perkembangan dunia modern. Penelitian ini menggaris bawahi peran diklat sebagai sarana untuk meningkatkan kompetensi guru PAI dalam ICT. Penelitian ini bertujuan untuk mendeskripsikan tingkat integrasi TIK dalam diklat guru PAI dan Komunikasi (TIK). Penelitian ini dilakukan di SMP Negeri 3 Teluknaga. Populasi dalam penelitian ini adalah 23 orang guru PAI madrasah dan dua orang fasilitator berpartisipasi sebagai informan. Teknik analisis data menggunakan model interaktif Miles dan Huberman. Hasil penelitian menunjukan bahwa guru PAI madrasah sudah mengintegrasikan TIK namun masih terbatas pada penggunaan presentasi terutama PowerPoint. Kedua, faktor usia dan masalah teknis menjadi kendala utama dalam mengimplementasikan integrasi tersebut dibandingkan dengan guru yang lebih muda cenderung memiliki tingkat kenyamanan yang lebih tinggi dengan teknologi baru karena mereka lebih terbiasa dengan penggunaan teknologi dalam kehidupan sehari-hari mereka. Sehubungan dengan ketersediaan fasilitas TIK di SMP Negeri 3 Teluknaga tergolong baik. Penelitian ini merekomendasikan pihak sekolah untuk memberikan banyak pelatihan dan dukungan kepada guru untuk meningkatkan penguasaan mereka terhadap teknologi dan mengintegrasikannya dengan efektif dalam proses pembelajaran

A B S T R A C T

Integrating information and communication Technology (ICT) into learning has a very important role in facing the demands of the development of the modern world. This research underlines the role of education and training to increase PAI teachers' competence in ICT. This research aims to describe the level of integration and communication, and technology in PAI teacher training. This research was conducted at SMP Negeri 3 Teluknaga. This research was conducted at SMP Negeri 3 Teluknaga. The population in this study was 23 madrasa PAI teachers and two facilitators participating as informants. The data analysis technique uses the Miles and Huberman interactive model. The research results show that PAI madrasah teachers have integrated ICT but still need to expand to using presentations, especially PowerPoint. Second, age factors and technical problems are the main obstacles in implementing such integration compared to younger teachers, who tend to have a higher level of comfort with new technology because they are more familiar with the use of technology in their daily lives. The availability of ICT facilities at SMP Negeri 3 Teluknaga is

classified as good. This research recommends that schools provide a lot of training and support to teachers to improve their mastery of technology and integrate it effectively into the learning process.

.

INTRODUCTION

The development of information technology media requires educational staff to integrate it into the 21st century learning process. Certainly, IT has become the main source to support the daily learning process in the classroom. For example, the use of the internet is a necessity that cannot be ignored in teaching in class. The amount of internet use by teachers to access teaching materials has increased sharply (Schofield & Davidson, 2017; Zhang, 2020). Based on the results of research conducted in Indonesia, internet users are generally dominated by university level students and lower-level students, respectively amounting to around 73.7% of the Indonesian population (Basit et al., 2024)

Apart from that, the Government through the Indonesian National Education Standards Agency (BSNP) recommends accessing the internet to look for the latest teaching materials. Continuing to use textbooks (non-paperless) as a source of information in learning makes the learning process monotonous and boring (Saleh et al., 2023); uses up a lot of budget, but using the internet makes education costs cheaper and allows students and teachers from anywhere in the world to communicate, collaborate and exchange knowledge, which can improve quality of human life.

Considering the advancement of technology, instructors or teachers can use various digital tools and resources to enhance the learning experience of their students. For example, teachers can use online learning platforms to provide information in interactive formats, develop online quizzes to assess student understanding, and use applications to make learning more interesting and engaging for their students. Furthermore, technology enables teachers to deliver rapid and efficient feedback to students (Alam, 2023), as well as personalize instruction based on each student's unique requirements. Teachers who use technology intelligently may create dynamic and effective learning environments that educate students to confront the challenges of an increasingly digital society (Mhlongo et al., 2023).

The integration of ICT in learning plays an important role in improving learning outcomes and improving a pleasant learning environment. Purwanto et al., (2023)

indicated that ICT makes it easier for students to acquire skills, competencies and social skills to support the 21st century intelligence that is currently developing. Several studies have been conducted which show that the appropriate use of ICT in the learning process can improve the quality of education, connect learning with real life situations, and can introduce information technology and create opportunities for students to complete assignments independently (Iman et al., 2023; Shofwan et al., 2023; Toma et al., 2023). According to these result, learning is a lifelong, ongoing activity where students change their expectations by seeking knowledge through ICT which departs from traditional learning approaches towards modern learning. And currently the skill of using ICT in learning is a very necessary prerequisite for today's students.

The demand for Information and Communication Technology (ICT) competencies is increasing for teachers as the front guard in education in the digital era. These skills give them wider access, enabling them to access new knowledge, integrate it into teaching practice, and develop innovative methods and approaches through ICT (Lavrenova et al., 2020; Valverde-Berrocoso et al., 2021). Furthermore, Information and Communication Technologies (ICT) enable teachers to adapt course materials to the specific circumstances and individual needs of their students (Lavrenova et al., 2020; Valverde-Berrocoso et al., 2021).

Furthermore, teachers should be capable of transferring knowledge, attitudes, behaviors, and skills to their students using learning strategies and patterns that align with the demands and advancements of the 21st century. Professional educators consistently employ creative and innovative approaches to impart knowledge, skills, and attitudes to their students, including the creative use of learning media. Research by (Abraham et al., 2022) suggests that educators who are skilled in Information and Communication Technology (ICT) management develop into more proficient communicators. ICT integration makes studying more interesting, gives students more autonomy, and boosts their desire to learn

Teachers as professional educators are expected to always have an open mindset and to keep developing themselves as part of the effort of preparing learners to compete in global society life. One of the solutions that could be adopted is the use of education- and training, which is competency-based. The teachers have the right to access training and professional development in their field in the course of improvement in competency. Vrontis et al., (2022) also mention that training functions as a way to make possible for human resources to show their potential. ICT professional development courses for

teachers enables them to improve their ICT skills and knowledge (Guggemos & Seufert, 2021; Hu et al., 2021; Vrontis et al., 2022). An in-depth training program acts as a tool for improving the employees" skill and making it possible for them to do their job better.

The training center functions as a technical implementing unit in the field of education and training to organize education and training programs in accordance with established guidelines. Training Center, whose main responsibility is to provide education and training to administrative and technical personnel involved in religious affairs, tailored to their specific roles. And Responsibility. Likewise, the main function of the training center is to provide educational services to teachers and employees. The aim is to improve teacher knowledge, skills and attitudes so that they meet the competency standards required in government regulations.

The objective of the current study is to characterise the accuracy of ICT integration into the learning process, taking into account the availability of ICT facilities, the ICT training attended, and experiences and proficiency in utilising the computer to guide learning. The study's findings are highly significant, particularly when it comes to outlining the obstacles to ICT integration into training and suggesting potential improvements. Based on the mapping of the degree of ICT integration and the potential of human resources within the school, the primary operational value of this research will be the choices for improving ICT integration into training.

METHOD

The study employed a qualitative case-study approach, employing purposive sampling to increase the number of subjects required for in-depth information. The research subjects were four teachers of the Islamic Religious Education of school subjects at *SMP Negeri 3 Teluknaga*. The data were collected by means of interview, observation, and documentation. In the study, the researcher as a human instrument observed the learning process conducted in class (Merriam & Tisdell, 2015). To confirm data validity, the validity of the research data was first examined. In the research here, to obtain comprehensive data, triangulation was used by combining all the data from various sources in various ways and at various times. Besides, to gain trustworthiness, the transcription of the questions was cross-checked by each of the participants for any mistyped words or unconfirmed ideas. The data gained was analyzed and displayed descriptively. The data was analyzed using the interactive model of qualitative analysis from (Huberman & Miles, 2002).

The information gathered using inquiries followed the classification procedure; the author inputs all of the data and presents it in descriptive language. The final phase of the data-collecting process consists of developing and confirming results. The initial data conclusion is still speculative, the data may change if sufficient supporting evidence is not obtained at the next stage of data collection. The ultimate goal of qualitative research data is to answer problems based on the main research question.

RESULT AND DISCUSSION

The study's findings emphasise the critical role that training facilities play in incorporating information and communication technology (ICT) into the instruction process. According to Table 2, every classroom has been equipped with the materials and equipment required for incorporating ICT. However, issues with Internet connectivity continue even though the training center's whole campus is blanketed with wifi hotspots. In this study, researchers actively participate in careful observational monitoring of classroom learning activities. A comprehensive assessment of the validity of the research involved verifying the authenticity of transcripts from participant interviews.

To generate a complete data collection, a triangulation strategy is utilised to merge data from many sources that were obtained using diverse techniques and timings. Descriptive data analysis was performed using Miles & Huberman's (2014) interactive model for qualitative analysis. The information gathered from interviews is arranged according to themes about the use of ICT in Islamic Religious Education classes. The data is rewritten in the entirety and given in a descriptive way once it has been organised. This study's conclusion includes preliminary results that might change when more information is gathered. In qualitative research, the closing strategy aims for answers to the research questions presented at the beginning of the study.

The primary indication concerns ability and comfort with using computers for learning. The results indicate that some respondents were not accustomed to utilising ICT as a teaching tool (one of the ICT tools covered in this course is making powerful PowerPoint presentations). It's interesting to note that out of the thirty responders, only eleven utilise PowerPoint, and none use email, blogs, or websites as teaching tools for Islamic Religious Education classes. Thus, it would be generally agreed that Islamic Religious Education instructors would benefit from ICT training and use. Table 2 presents the findings from interviews conducted with two schools and seven participants. The findings indicate that age is a contributing factor to the incompetence of instructors in

using the different ICT facilities made accessible by school personnel. To assist the achievement of educational objectives generally and the integration of ICT into learning specifically means and resources play significant roles in the field of education.

The effectiveness of the instructional process also depends on the ongoing development of its means and resources. Internet connectivity and projectors in every classroom should be required resources. ICT resources should thus keep up with the ever-accelerating pace of technological progress since they constitute some of the essential components of educational supply. Table 3 below lists the different methods and resources that facilitate the use of ICT in the learning process based on the data gathered throughout the research.

Table 2. The Result of Interview with Respondents Indicator Interview Result

Participants" competence in computer utilization	An older teacher finds it difficult to keep up with the rapid advancements in ICT, which ultimately leaves the instructor completely overwhelmed when it comes to using the tool meant to supplement the content being taught. The PowerPoint computer programme is typically the sole tool available to teachers for use in their instruction. As of right now, the RTC teachers undergoing training do not conduct their lessons via email, blogs, or websites. Limited understanding of how to use ICT; Absence of computer skills; Absence of resources based on ICT
Availability of facilities	A technical issue here is the inconsistent state of the Internet network, which has a detrimental influence on the preparation already done by facilitators attempting to conduct learning through the use of ICT. Although the whole RTC area is already covered by the wireless hotspot capability, at times it is still not feasible to connect to the Internet network. .
Facilitators and ICT training program	Participants in training have participated in four different kinds of training. The four training formats are shown here, arranged from most popular to least popular. Internet usage, presentation media (currently limited to PowerPoint), ICT-based learning innovation, basic computer use, and presentation media (A, B, and C). The majority of training attendees claim to have participated in all four kinds of training.

Tabel 3. Internet Facilities

Types of equipment	Total
Desktop Computer	64 units
Laptop	53 units
Internet access	up to 13 Mbps
LAN (WIFI)	9 units
Sound System	5 units
Server computer	3 units
Kamera Digital	2 units
Handycam	1 unit
Television	7 units
LCD/LED	10 units
Computer & Multimedia laboratory	1 room
	13 points

Computer and Internet access support means and resources for quality improvement in education and learning. Such resources are expected to raise extrinsic motivation that improves the teaching and motivation of facilitators and learners, especially with the Internet's significant influence on education. Proper use of technology will overcome the shortcomings that have hampered the learning process. The Internet provides more information and facilitates communication, discussions, and question-and-answer sessions that help students overcome difficulties.

The third indicator was the types of ICT training participants attended. Based on the interview results, four types of training were participated in by training participants. The four types of training, the most frequently attended to the least frequently attended, are (A) primary computer use, (B) ICT-based innovation in learning, (C) media presentation only PowerPoint, and the Internet. The training participants have attended all four types of training. The primary indication concerns ability and comfort with using computers for learning. The results indicate that some respondents were not accustomed to utilizing ICT as a teaching tool (one of the ICT tools covered in this course is making powerful PowerPoint presentations).

DISCUSSION

Research findings show that most respondents have experience using several types of ICT as learning media in Islamic Religious Education classes. This is in line with Amarasinghe & Brodacz-Geier (2024) found that ICT can be used to improve the teaching and learning process.

It further states that There are three primary goals for using ICT in the classroom:

to develop: to build knowledge in problem-solving and competence in communicating and in searching; managing information involves acquiring new knowledge and sharing it with others; it also involves improving skills in using Information and Communication Technology (ICT).; and to increase effectiveness and efficiency in learning. ICT is a powerful tool for utilizing 21st-century skills (Suleiman et al., 2020). The integration of information and communication technology in the process of teaching and learning will empower teachers to focus more effectively on student-centred approaches, active and interactive learning, connecting with students' experiences and needs, and the development of a critical and ethical understanding of the value of ICT use (Rahmatullah et al., 2022). So, this type of ICT is beneficial. Another reason is also its ability to enrich the facilitator's teaching material. Its ability to enrich the facilitator's teaching material is an additional reason.

In addition, a shortage of ICT-related content, inadequate facilities, and insufficient expertise in using ICT equipment are often the main obstacles to ICT integration. In a similar discovery (Junaidi et al., 2020; Rahiem, 2020) the main obstacles faced by instructors were age, a lack of computer proficiency, a lack of ICT-based resources, insufficient knowledge and expertise, and time management issues. Another barrier to using ICT in training center is that participants must return to their work units after completing the education and training process, as this is only training. The training participants were estranged as a result. In a sense, the facilitator is not authorised to oversee the training of graduates.

Instructors or teachers must focus more on using social media as a source of teaching or teaching materials. Teachers ignore this mainly because they need to learn to use the platform as a substitute for teaching strategies. Teachers must fully accept social networking sites as additional media to enhance learning management systems, even though they may already be using or familiar with them. Social or social networking sites have a uniqueness or specialness that can attract students and be accessed at low cost because these sites are well known to students; these sites provide a viable, although underutilized, opportunity to improve the educational process.

The training center has successfully integrated ICT into the teaching and learning process, providing access to resources for all classes. However, internet access is still limited, even though there are wireless hotspots. The final thing to consider is the nature of the ICT training participants have attended. Should there be additional training sessions aimed at teachers who have difficulty implementing ICT into their teaching

methods? This will ensure they are adequately equipped to keep up with technological advances. The main insight from(Junaidi et al., 2020) highlights the lack of training programs for teachers in implementing ICT in the classroom. Likewise, (Rana et al., 2022) identified that the main challenges teachers face in implementing ICT in education is adequate training. Recent research in southern Finland also shows significant problems, One of the findings discovered by(Rana et al., 2022) s the absence of in-service training programmed for science teachers regarding new ICT tools. Furthermore, (Tawfik et al., 2021) observed that the limited training available to teachers is a barrier to the use of ICT in schools.

Based on the findings, it is important to pay attention to the management in conducting the training in order to maintain quality assurance, consisting of conformity among the material, the media, the instructor/facilitator, and the required facilities. Well-managed training will help to ensure good final outcomes.

Moreover, the role of the programme manager and facilitator must be distinct from that of the trainer. The programme manager may be an external individual or an employee of the company offering the training, such as a school. The role of the programme manager is to determine the participants and the required materials. To assist teachers in overcoming obstacles when integrating ICT into the classroom and resolving issues with the hardware and software they use, a training programme also needs a facilitator. An individual deemed to have expertise and aptitude with the training content, or someone who began their career as a computer skills and information management teacher at a school, can serve as a facilitator (Califf & Brooks, 2020; Sailer et al., 2021; Yıldırım et al., 2020).

The headmaster and technical staff division for education and religion claims that these are not yet grounded in a need analysis. Consequently, the majority of instructors only participate in one ICT training event over the course of a year. Computer proficiency among teachers might be enhanced by ICT training programmes (Ahmad & Shah, 2022; Kareem et al., 2022; Nikimaleki & Rahimi, 2022).When it comes to preparing teachers to utilise computers, training is crucial. Additionally, it may enhance educators' attitudes towards using computers and help them enhance their lessons, which should raise educational standards (González-Zamar et al., 2020; Machmud et al., 2021; Saif et al., 2022; Yuting et al., 2022). ICT trainings have the potential to serve as a medium for instructors to enhance their proficiency in integrating ICT.

Study results show that quality training programs help teachers integrate

information and communication technology (ICT) into the learning process and provide changes in teaching practices(Goh & Sigala, 2020). Rana & Rana (2020) state that the effective use of ICT in teaching has a good impact on learning outcomes if training is carried out in a sustainable manner, supported by modern technology, providing a conducive training environment, and having a commitment to developing student achievement. In addition, ICT training has been shown to help teachers in computer use (Garzón Artacho et al., 2020; Mailizar & Fan, 2020). Professional training programmes must be designed by considering beliefs about teaching efficacy, improving teaching policies, and developing syllabi appropriate to teaching goals (Ahmad & Shah, 2022; Kareem et al., 2022; Nikimaleki & Rahimi, 2022).

Organizing learning programs using ICT will certainly present challenges for schools to use ICT optimally. To improve teachers' professional competence, various efforts continue to be made, including creating more innovative learning materials. Therefore, companions must always follow the latest technological developments.

Based on the results of research conducted, schools have optimized the use of ICT in learning by implementing various programs and strategies to complement ICT-based facilities and resources. For example, all classrooms are equipped with LCDs, Internet access and ICT-based equipment. In addition, provide laptops for facilitators who do not have laptops. Organizing distance training to integrate ICT. developing a participant registration application.

CONCLUSION

This research aims to determine the integration of ICT in Islamic religious education learning. First, ICT learning has yet to be fully implemented in the training carried out by the school. Second, the participants' paradigm in utilizing the basics of ICT in learning is still limited to making presentations via PowerPoint. The use of the internet is still limited to searching for additional information regarding the material to be presented, reading the news, not making it part of a new learning system strategy, which is integrated into the learning process carried out to increase learning capacity; Likewise, the use of social networking sites has not been appropriately utilized as a source of various essential resources as part of the learning system. Third, increasing teacher professionalism can still be considered a significant and troubling obstacle, especially when faced with other technical obstacles, such as financing and internet connectivity. Regarding the intensity of ICT mastery, teachers need to take more ICT

training in order to have strong experience and provide various adequate ICT facilities and resources for the use of ICT in the teaching and learning process in the classroom.

REFERENCES

Ahmad, H., & Shah, S. R. (2022). Teacher agency and professional development: A study on Cambridge English teacher program in the Arabian Gulf. *Cogent Education*, *9*(1), 2080352.

Amarasinghe, S., & Brodacz-Geier, M. (2024). *ICT-Enable Teacher Professional Development from the Pedagogical Dimension for 21st Century: A Preliminary Analysis of the ICT Integration of CONTESSA Modules BT - Empowering Education in Cambodia and Sri Lanka: Quality Improvement in Teaching and Learn* (S. Hummel (ed.); pp. 153–161). Springer Fachmedien Wiesbaden. https://doi.org/10.1007/978-3-658-43306-2_10

Califf, C. B., & Brooks, S. (2020). An empirical study of techno-stressors, literacy facilitation, burnout, and turnover intention as experienced by K-12 teachers. *Computers & Education*, *157*, 103971.

Garzón Artacho, E., Martínez, T. S., Ortega Martin, J. L., Marin Marin, J. A., & Gomez Garcia, G. (2020). Teacher training in lifelong learning—The importance of digital competence in the encouragement of teaching innovation. *Sustainability*, *12*(7), 2852.

Goh, E., & Sigala, M. (2020). Integrating Information & Communication Technologies (ICT) into classroom instruction: teaching tips for hospitality educators from a diffusion of innovation approach. *Journal of Teaching in Travel & Tourism*, *20*(2), 156–165. https://doi.org/10.1080/15313220.2020.1740636

González-Zamar, M.-D., Abad-Segura, E., López-Meneses, E., & Gómez-Galán, J. (2020). Managing ICT for sustainable education: Research analysis in the context of higher education. *Sustainability*, *12*(19), 8254.

Huberman, M., & Miles, M. B. (2002). *The qualitative researcher's companion*. sage.

Junaidi, J., Budianto Hamuddin, B., Wendy, S., Fathu, R., & Tatum, D. (2020). ICT usage in teaching English in Pekanbaru: Exploring junior high school teachers' problems. *International Journal of Advanced Science and Technology*, *29*(03), 5052–5063.

Kareem, J., Thomas, R. S., & Nandini, V. S. (2022). A conceptual model of teaching efficacy and beliefs, teaching outcome expectancy, student technology use, student engagement, and 21st-century learning attitudes: A STEM education study. *Interdisciplinary Journal of Environmental and Science Education*, *18*(4), e2282.

Machmud, M. T., Widiyan, A. P., & Ramadhani, N. R. (2021). The Development and Policies of ICT Supporting Educational Technology in Singapore, Thailand, Indonesia, and Myanmar. *International Journal of Evaluation and Research in Education*, *10*(1), 78–85.

Mailizar, M., & Fan, L. (2020). Indonesian Teachers' Knowledge of ICT and the Use of ICT in Secondary Mathematics Teaching. *Eurasia Journal of Mathematics, Science and Technology Education*, *16*(1).

Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative research: A guide to design and implementation*. John Wiley & Sons.

Nikimaleki, M., & Rahimi, M. (2022). Effects of a collaborative AR-enhanced learning environment on learning gains and technology implementation beliefs: Evidence from a graduate teacher training course. *Journal of Computer Assisted Learning*, *38*(3), 758–769.

Rahiem, M. (2020). *Technological barriers and challenges in the use of ICT during the COVID-19 emergency remote learning*.

Rahmatullah, A. S., Mulyasa, E., Syahrani, S., Pongpalilu, F., & Putri, R. E. (2022). Digital

era 4.0: The contribution to education and student psychology. *Linguistics and Culture Review*, *6*(S3), 89–107.

Rana, K., Greenwood, J., & Henderson, R. (2022). Teachers' experiences of ICT training in Nepal: How teachers in rural primary schools learn and make progress in their ability to use ICT in classrooms. *Technology, Pedagogy and Education*, *31*(3), 275–291.

Rana, K., & Rana, K. (2020). ICT Integration in Teaching and Learning Activities in Higher Education: A Case Study of Nepal's Teacher Education. *Malaysian Online Journal of Educational Technology*, *8*(1), 36–47.

Saif, S. M., Ansarullah, S. I., Ben Othman, M. T., Alshmrany, S., Shafiq, M., & Hamam, H. (2022). Impact of ICT in modernizing the global education industry to yield better academic outreach. *Sustainability*, *14*(11), 6884.

Sailer, M., Schultz-Pernice, F., & Fischer, F. (2021). Contextual facilitators for learning activities involving technology in higher education: The C♭-model. *Computers in Human Behavior*, *121*, 106794.

Suleiman, M. M., Yahya, A. T., & Tukur, M. (2020). Effective utilization of ICT tools in higher education. *Development*, *2*(5).

Tawfik, A. A., Shepherd, C. E., Gatewood, J., & Gish-Lieberman, J. J. (2021). First and Second Order Barriers to Teaching in K-12 Online Learning. *TechTrends*, *65*(6), 925–938. https://doi.org/10.1007/s11528-021-00648-y

Yıldırım, B., Topalcengiz, E. S., Arıkan, G., & Timur, S. (2020). Using virtual reality in the classroom: Reflections of STEM teachers on the use of teaching and learning tools. *Journal of Education in Science Environment and Health*, *6*(3), 231–245.

Yuting, Z., Adams, D., & Lee, K. C. S. (2022). The relationship between technology leadership and teacher ICT competency in higher education. *Education and Information Technologies*, *27*(7), 10285–10307.