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A Review of the online teaching engagement and the analysis of interactions of both face-to-face and online students using FLO

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1 Contents

1.1 Glossary

PLENK- Personal Learning Environments, Network and Knowledge

MOOC- Massive Open Online Courses

MobiMOOC- Mobile Learning

CritLit- Critical Literacies

EduMOOC- Online Education

IIT- Indian Institutes of Technology

Moodle- Modular Object-Oriented Dynamic Learning Environment

QRF- Quality Reference Framework

GEMP- Graduate Entry Medical Program

MPT- Master of Physiotherapy

SPSS- Statistical Package for the Social Sciences

SMS- Self Management Support

LSD- Lowest Significant Difference

TAM- Technology Adoption Model

PU- Perceived Usefulness

PEU- Perceived Ease of Use

BI- Behavioural Intention

SI- Social Intention

ATT- Attitude towards

NASM- National Association of Schools of Music

BA- Bachelor of Arts

OL- Online Learning

ODL- Online Distance Learning

OLC- Online Learning Community

FLO- Flinders Learning Online

FAN- Flinders Authentication Name

DE- Distance Education

GE- Graduate Entry

U- Undergraduate

IPS- Interactions Per Student

Etc- Et-cetera

Vs- Versus

N/A- Not applicable

1.2 List of tables

1.3 List of figures

1.4 Declaration

I certify that this work is an extension of COMP9710(A, B) and does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

Amandeep Kaur Pawar

24th June 2020

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1.6 Abstract

In this research document, the information about the interactions of online students has been extracted. An interaction is defined as “Removed due to copyright restriction.” ("Interaction," 2020). In the context of the research, interactions are the number of clicks on a specific file or number of times a file is viewed. Study has been done to find out the differences in the level of interaction on FLO (Flinders Learning Online) between 2018_F2F (Face-to-face), 2018_DE (Distance Education), 2019_DE, 2019_GE (Graduate Entry) and 2019_U (Undergraduate) students where 2018 and 2019 belong to year of enrolment and F2F, DE, GE and U belong to mode of learning. Also, the information is extracted for five different groups enrolled in COMP1711 and COM8711 (Database Modelling and Knowledge Engineering) in 2018 and 2019. Modules like assignments, tutorials, quizzes, and checkpoints have been looked upon. Students interacted more with assignments and tutorials in their respective weeks. Moreover, the practical course material interacted when the checkpoints regarding them were due. Overall, the students enrolled in 2018 were the ones who interacted with all the modules with the highest number of interactions. Additionally, using time intervals, 1 pm to 2 pm was the busiest and the most active time. The most interesting observation is the interactions by online students of the 2018_DE group. Only 11 students made highest interactions as compared to other online and face-to-face students. The data analysis in section 9 and inferential statistics in section 10 show similar results for the level of interactions. Future work should investigate if there is a relationship between online interaction, attendance, and final grades.

2 Introduction

Online courses require digital tools and resources for their usage. The foremost condition for enrolling in online courses, at any level, is access to the internet. Online access to materials provided by the teacher, communication between teacher and learner, and student-to-student interaction is necessary for online courses (Koutsoupidou, 2014). It can be accessed through synchronous and asynchronous ways. Synchronous ways utilize digital resources like Skype and Google Hangouts, which means both instructors and students are interacting at the same time with the real-time transmission of voice at different locations. Asynchronous platforms like Blackboard and Moodle (Modular Object-Oriented Dynamic Learning Environment) are used by teachers to upload course material, readings, announcements, syllabus information, discussion boards, and student forums. Moreover, students access these platforms to use these services (Koutsoupidou, 2014). According to Johnson and Aragon (2003, pp.31-43), "Removed due to copyright restriction."

3 Aim of the research

The courses offered online are of great benefit for the institution because they need not spend money on construction and more facilities. The capacity to utilize and convey various types of instructional materials legitimately to the student, enlarged by the student's opportunity to return to course content freely, is particularly alluring as it holds the guarantee of more prominent student commitment in active learning than typical in the standard classroom. According to Mehrotra and McGahey (2012, p.60), "Removed due to copyright restriction" Flexible scheduling, travel time, and distance to institutions were the foremost components for choosing online courses by students. (Mehrotra & McGahey, 2012)

In this research work, it entails the comparison for online activities performed by students enrolled in 'Database Modelling and Knowledge Engineering' under different categories that are COMP1711 U(Undergraduate), COMP1711 DE (Distance Education), and COMP8711 GE (Graduate Entry).

The data sets have been taken from FLO (Flinders Learning Online) to analyze the comparisons between the three categories of UG, DE, and GE.

Moreover, there are different technologies used in online teaching. Flinders University uses Moodle, which is a free, open-source Learning Management System (LMS) developed to assist educational organizations in providing online courses for better interaction with the students. It is the most popular and low-cost hosting services online learning system. It offers a toolbox for interactive online teaching. (Rice, c2007)

4 Research questions

1. How do we best engage with online learners?
2. Are there differences in the level of interaction on FLO between UG, GE, and DE students?

5 Sectional terminology

5.1 Traditional or face-to-face learning

According to Belise (2017), traditional learning session occurs when the internet network is poor, and the student takes hard copies of the content, he downloaded or saved earlier. Traditional learning requires teachers with face-to-face interaction and providing activities to perform in the classroom. Moreover, these activities include assignments, workshops, quizzes, etc. where students interact with other students to discuss and exchange their ideas (Othman, Pislaru, & Impes, 2013).

In medical fields, as the organizations move towards online learning, students started approaching more towards face-to-face learning. In addition to this, traditional education is considered as most useful to grasp content quickly and easily. Also, student's facial expressions help instructors to know if students are getting the idea that has been delivered (Gruendemann, 2011).

Students believe that in face-to-face learning, the teachers encourage students and give feedback that help them to improve. A study revealed that face-to-face learning allows us to disclose the ideas in a better way by expressing with direct interaction and body language. In short, face-to-face learning is the result of body language, facial expressions, and caring teachers. It is the best way to resolve problems that emerged from a misunderstanding of text emails, which are sometimes unclear about what the teacher wants to convey (Gruendemann, 2011).

5.2 Distance Education

Online teaching is supposed to be a modern form of distance education, offering a variety of features that were impossible in correspondence courses and instructional television. It has achieved tools that allows synchronous and asynchronous communication and collaboration that also provide number of options to deliver course content (Perry & Pilati, 2011, p. 97). Distance education attracts the students that live far away from educational institutions, and those who do not want to be attendance bounded. Moreover, it is independent of time limits to engage with course content anytime (Perry & Pilati, 2011, p. 99).

According to Al-Arimi (2014), distance education is the field that focuses on technology and instructional system design, which helps to deliver the training effectively. Also, it helps to communicate synchronously and asynchronously.

Distance education is categorized in five ways (Al-Arimi, 2014):

- Through mails (correspondence conductance)
- Through the internet (synchronous and asynchronous)
- Through hard disks (data stored in hard drives and provided to the student)
- Through radio or television
- Through mobile technologies (data accessing with wireless networks on laptops, mobile phones, etc.)

Additionally, when teacher and student are not present at the same place, and they use some communication medium to interact with each other, sitting at a distance is termed as distance education. This distance can be reduced by increasing the number of interactions with the teacher as it helps to understand the content in a better way (Frey, 2018).

The main aim of distance learning is to provide flexible infrastructure. It would also raise the level of digital literacy by using new technologies that would help to create high-quality educational content. Lectures are recorded, and presentations are made to deliver content to make it worthwhile. Also, students can ask questions and get answers within a few days for any problem through e-mails. Pandza and Masic (2010, p. 230) stated that this approach could not replace face-to-face communication completely. The courses in which attendance is compulsory for exams are called hybrid distance learning (Pandza & Masic, 2010). Distance education has also been taken as an economic and social tool for information society by the Governments because it is planned systematically (Harry, 1999).

5.3 Online Learning

Online learning started at the beginning of the 1980s. Some authors have defined online learning similarly and some differently. According to Harasim (2000), there are five different attributes of online learning in the context of communication that guides implementing and designing online courses, and unique combination of environment for online learning which are given below:

- Many-to-many (group communication)
- Any place (place independence)
- Any time (time independence)
- Text-based (enhanced by multiple media)
- Computer-mediated messaging

But according to Allen and Seaman (2007), the courses in which 80% of the content is delivered online is called an online course. They categorized the courses according to the percentage delivered online. The courses where 0-29% of the content is delivered online called face-to-face, including traditional and web facilitated courses, whereas the courses in which 30-80% content delivered online called blended instruction or hybrid (Allen & Seaman, 2007).

Online learning has grown because it fulfills the needs of students who live far away from the institution or want to be independent of time and place. On the other hand, it has not been accepted globally. Teachers and institutions that use the only online medium for interaction have praised it. In a survey, 65% of institutions gave a positive response saying, “online learning is a critical part of their long-term strategy” (Chen & He, 2013).

Harasim (2000, pp.49-50) argued that “Removed due to copyright restriction.” The important difference between online education and distance education is that online

education is a group communication process similar to face-to-face seminar-type courses.

"Removed due to copyright restriction" (Harasim, 2000, p. 59) , while some said "Removed due to copyright restriction" (Bonk & Graham, 2005, p. xix). Now, it is considered as the major element in the higher education matrix. "Removed due to copyright restriction" (Perry & Pilati, 2011, p. 95).

In some public sectors, online learning has been accepted fully by community colleges to provide education to diverse learners. On the contrary side, it is argued that "Removed due to copyright restriction" (Perry & Pilati, 2011, p. 97).

5.4 Flipped classroom

A flipped classroom is a teaching style that is divided into three components: before class, during class, and after class (Gilboy, Heinerichs, & Pazzaglia, 2015). These components help teachers to design courses and categorize activities. For before class component, students are provided with content like mini lectures (not more than 15 minutes), videos from online sources, lecture slides, and worksheets that they need to study before coming to the class. This component focuses on remembering and understand the content. During class component, also called face-to-face component, the higher-level learning such as application, analysis, and synthesis of knowledge acquired from the first component, using active learning strategies, is delivered (Gilboy, Heinerichs, & Pazzaglia, 2015). It also includes debates and discussions with other students, as an instructor is present there to clarify any doubts or misconceptions. The last component of the flipped classroom style is after class component. Assessments, either formative or summative, are an integral part of this component, which can be in the form of exams, case studies, presentations, reflection papers, test creation by students, and group testing (Gilboy, Heinerichs, & Pazzaglia, 2015).

Abeysekera and Dawson (2014) defined flipped classroom as a set of pedagogical approaches that:(1) move most information-transmission teaching out of class (2) use class time for learning activities that are active and social and (3) require students to complete pre- and/or post-class activities to fully benefit from in-class work.

According to Gilboy, Heinerichs, and Pazzaglia (2015,p. 112), "Removed due to copyright restriction." The flipped class is an innovative approach as it provides "Removed due to copyright restriction" and "Removed due to copyright restriction" to address the learning styles throughout the course (Gilboy, Heinerichs, & Pazzaglia, 2015, p. 113)

5.5 Blended learning

Blended learning is a combination of online learning and traditional face-to-face learning. Mostly flipped courses are considered as a type of blended course (Bonk & Graham, 2005). In instructional science, the terms of blended learning and hybrid learning can be interchanged (Ifenthaler, 2012). Blended learning involves media, instructional designs, and flexibility that provides many options for knowledge

delivery and skill development. The most common definitions of blended learning are (1) a combination of different modes of instructions (2) a combination of methods used to instruct (3) a combination of face-to-face and online instructions (Bonk & Graham, 2005).

In blended learning, four factors measure the quality of education, which are the curriculum, organized learning activities, support in learning, and instructional evaluation (Bonk & Graham, 2005).

5.6 MOOC

Massive Open Online Courses provide courses independent of geographical location to a large number of participants, without any formalities like entry requirements (Boyatt, Joy, Rocks, & Sinclair, 2014). It helps to make a network among experts and participants to create knowledge. Many institutions offer hundreds of courses through MOOCs covering a wide range of topics. Autonomy, diversity, openness, and connectedness were four characteristics developed within the MOOC.

MOOCs are further categorized as cMOOC and xMOOC. A cMOOC integrates connectivity of social networking, an acknowledged expert in the study field, and online resources. The level of participation in MOOCs depend on the learner's preferences, objectives, background, and time (Boyatt, Joy, Rocks, & Sinclair, 2014). PLENK, MobiMOOC, CritLit, and EduMOOC are subsequent MOOCs in cMOOC. cMOOC uses abundant online resources like blogs and forums, but a few exist with a clear methodology for research questions whereas the xMOOC model is constituted of courses made by institutions, with a mass of availability, free online mode with no entry formalities (Boyatt, Joy, Rocks, & Sinclair, 2014). Coursera, Udacity, and edX lie in the category of xMOOC. MOOCs' learners can also participate in learning communities by blogs and forums and provide support and feedback for peer assessment mechanism. cMOOC and xMOOC platforms allow institutions to design courses that can be provided worldwide.

For traditional courses, learners have to pay credit as tuition with a limit of a few enrolments (Singh, Gandhi, & Nand, 2014). On the other hand, MOOC is free with unlimited participation in courses and learner has to pay for the certification only. MOOCs open up new opportunities for the design and delivery of knowledge for on as well as off-campus students (Singh, Gandhi, & Nand, 2014; Iqbal, Zang, Zhu, Chen, & Zhao, 2014). Additionally, MOOCs decrease the number of years to complete a degree. The shortcomings of MOOCs are the completion rate of courses and student-teacher interaction, accreditation, plagiarism, sustainability, attrition, etc. (Iqbal, Zang, Zhu, Chen, & Zhao, 2014; Boyatt, Joy, Rocks, & Sinclair, 2014).

5.7 Comparison of Delivery Methods

From the above analysis of delivery methods, it can be seen that online education is not the same as distance education, although it shares some of the same attributes. The only difference between them is the communication process used to interact with instructors. Teachers can understand students better by face-to-face communication by

reading facial expressions rather than interacting through text messages or e-mails. Also, the face-to-face method is more effective as teachers can emphasize the topic that students cannot understand easily by elaborating on it.

On the other hand, distance education provides independence to students who cannot come to universities or institutions due to some reasons. They are independent of location and time and are not bounded by workshops and lectures. They can access course material at any time at any place. Moreover, distance education has been used by Governments as an economic and social tool for the information society, due to systematic planning of the content to be delivered.

Blended learning is similar to the flipped classroom with some common attributes. These attributes are online content and face-to-face interaction. Blended learning has two parts, online content, and face-to-face interaction, whereas flipped classroom has three sessions: before class, during class, and after class. Students are provided with study material to go through and ask questions or clear doubts in a face-to-face session. But flipped classroom provides material before face-to-face interaction for clearing misconceptions, and students are to perform activities like debates to engage and exchange ideas with other students in the same session as well. Additionally, there are formative and summative assessments to complete in the after-class session. It can be concluded that the flipped classroom is the combination of all other methods defined in this section and is more effective.

Lastly, MOOC is suitable for those who do not want to spend more money but are interested in gaining knowledge. It also provides a platform to share their knowledge and take part in discussions being held. But it has to face enormous dropouts due to some concerns like plagiarism, accreditation, attrition, etc.

6 Literature review

6.1 Attributes affecting acceptance and prediction of disengagement in online learning

Higher education systems are accepting online learning and Online Learning Communities (OLCs) world-wide for different benefits like facilitating information exchange and collaborative learning, improving teaching and learning quality and for improvement in education and training access (Farahat, 2012; Ke & Hoadley, 2009). User acceptance is an important factor in determining the success and failure of the information system project (Davis, 1993 as cited by Farahat, 2012). Many Egyptian universities continued to invest a huge amount of financial resources and efforts to implement online learning due to its unique characteristics but students were hesitant about this online learning system as online delivery system depends on students' ability to use the internet, electronic communication and autonomous learning which affects engagement ability.

The research was conducted to know about students' determinants that can affect and influence them to accept online learning (Davis, 1993). It was analysed that attributes,

like students' perceptions of usefulness and ease of use, attitudes (ATT), and social influence factors, could affect students' acceptance towards online learning. The acceptance of information technology by users was predicted by using Technology Adoption Model (TAM) through two factors: Perceived Usefulness (PU) and Perceived Use of Ease (PEU) (Farahat, 2012). PU and PEU are defined as the degree to which a person believes that technology usage produces better results and students' perception about the degree of effort required to learn online, respectively. The core idea of TAM is determined by Behavioural Intention (BI), which shows students' plans to use or not to use online learning activities and Social Intention (SI) that affects students' behaviour within an online learning environment, as it defines the degree to which an individual watches for other behaviour to use the system (Farahat, 2012).

Also, the key concept to predict learners' activities is disengagement detection (T & Sengottuvelan, 2016). Some methods like Bayesian Nets (BNs), Logistic Regression (LR), Simple Logistic classification (SL), Bagging using Reduced Error Pruning tree classifier, Classification via Regression (CvR), etc. are used to predict disengagement of students (Cocea & Weibelzahl, 2011). The prediction is detected using log file analysis. The registered actions in log files are inspected, and attributes for the analysis are established. The accuracy and reliability of prediction can be affected by some noise or unnecessary attributes (T & Sengottuvelan, 2016). To motivate students, many attempts were made by designing attractive multimedia materials by including game features but, despite these efforts, students even do not try to game and focus the systems.

6.2 Applications of Online Learning

"Removed due to copyright restriction," (Keengwe & Kidd, 2010, p. 534). Online learning is used for Self-management support training provided to the university student. Three approaches (1) traditional face-to-face (2) an e-learning approach and (3) a blended approach were compared and used in a study where the students of the Flinders University were the participants (Munro, et al., 2018). These students were enrolled in the second year in Graduate Entry Medical Program (GEMP) in Adelaide with traditional face-to-face approach and in Darwin with e-learning approach; and Master of physiotherapy (MPT) program in Adelaide with blended approach.

A feedback session was provided in the lecture format in the presence of an academic after delivery of the content and was ensured that students understood the assessment task (Munro, et al., 2018). This feedback session performed for all three groups with the same academics. They used a flowchart for student learning in various groups and looked for intervention, module delivery, practice, and feedback approaches. Also, they made a table to score the patient-centered care plan that assesses students' competency in adherence to care plan processes (Munro, et al., 2018). Using Flowchart and table, the correlation between the scores taken from Flinders university care plan, the engagement score, and global score across the three delivery methods was examined to determine any internal consistency between the three methods.

Research suggests that e-learning might be less appropriate to get emotional skills in Self-Management Support (SMS). In the above study, it was demonstrated that students in the blended group showed the greatest ability to give SMS in chronic care self-management across care plan development, engagement, and global score.

On the other hand, this study had potential limitations as all the students or participants were different in the manner of the clinical or educational experience. Master of Physiotherapy (MPT) students were in their final year, already working at a junior health professional level in their clinical placements. In contrast, some students just started their placement classes (Munro, et al., 2018). The significance of assessing the baseline level of participants' exposure could not be determined. Also, the study was investigated by only a single investigator. The students in the blended group practiced each other, which resulted in better learning differences. Thus, the blended approach provided students to reflect on the content and active engagement as well (Munro, et al., 2018).

A study conducted in 2010 revealed that in music education, availability of online courses had been increased by 277% from 9 to 34 institutions (Jody Neal Blake, 2018) but, it was concluded (Koutsoupidou, 2014) that the courses were neither inferior nor superior to the coursework that is, traditional; instead they provide an extra tool to the university, used to approach its ever-expanding Online Learning Community (OLC) (Koutsoupidou, 2014). The extension of physical learning communities to electronic ones are termed as OLCs (Ke & Hoadley, 2009; Aragon & Johnson, 2008).

6.3 Challenges in Online and face-to-face

Despite the expanding scope of online learning by providing unique facilities, it has not gained universal acceptance yet (Perry & Pilati, 2011). "Removed due to copyright restriction"((Lave, 1991; Linn, 1993; Scardamalia et al., 1992) as cited by Ke & Hoadley, 2009). Also, the appropriate use of technology is important to achieve success (Perry & Pilati, 2011).

On the contrary, mature people or those who are above 30, feel awkward to interact through face-to-face approach as they think they are "Removed due to copyright restriction" (Jaggars S. S., 2014) in the class and "Removed due to copyright restriction" (Jaggars S. S., 2014). One of the mature students stated that "Removed due to copyright restriction." (Jaggars S. S., 2014). They feel that they "Removed due to copyright restriction" (Jaggars S. S., 2014) talking about weekends as youngsters use to talk in classrooms and thus choose online courses. One biggest challenge in online learning was the increment in the rate of dropouts from online courses. It was 20% higher than the face-to-face approach in some community colleges (Aragon & Johnson, 2008) due to the lack of knowledge about enrollees. The study was conducted on 305 students out of which 216 were females, and 89 were males from a rural community college, which was in the midwestern United States, showed that 189 students completed at least one online course, and 116 were non-completers.

The non-completer students were contacted through phone calls and asked why they chose not to complete their online courses? Only 65 out of 116 non-completers responded to the calls while others disconnected the phone, returned a message, incorrect phone numbers, and did not answer the phone. The answers of students who responded to the phone calls fall into five different themes: personal time, course design or communication, technology, institutional issues, and learning preferences.

Twenty-two (22) students out of sixty-five said that personal issues, scheduling conflicts, lack of motivation and work conflicts; 18 responded designing of course and communication; 12 responded with issues related to internet and computer; 7 responded with advisement, enrollment, class cancellation and drop procedure issues; and 6 responded that format of the course did not relate to their learning preferences; were the reasons that restrict them to study.

Studies have recognized and analyzed basic issues influencing the nature of online training, for example, correspondence, innovation, time management, instructional method, and assessment. There are three foremost categories found for issues in online learning

- Issues related to online learners
- Online teachers
- Material development

Online learners face issues about their identity, their expectations, readiness, and their participation in the online courses. Teachers face issues like change in their roles for teaching content, management of time, styles of teaching, and change from face-to-face to online. Material issues incorporated the job of teachers in material development, incorporation of multimedia in content, the job of instructional systems in content improvement, and reflections for content improvement. There are associations, for example, Quality Matters and Online Learning Consortium, that pays attention to improving the nature of online instruction in higher education by giving assets and opportunities for coordinated effort on educational program improvement. (Kebritchi, Lipschuetz, & Santiague, 2017)

6.4 Participants' demographic information and units used in statistics

Certain factors are used in calculations to give appropriate results. These factors are gender, age, country, academic qualifications, years of experience, level of teaching, and type of institution (Koutsoupidou, 2014). In some papers, R square, adjusted R square, standardized coefficient beta, and collinearity statistics tolerance are used (Farahat, 2012). Chi-square was used to research significant differences, and the correlation coefficient was used for determining the degree of covariation after finding differences. The Pearson product-moment correlation coefficient was used to summarise the strength and direction of a linear relationship (Aragon & Johnson, 2008). T-test was performed to compare the means of completers and non-completers of online courses in Aragon and Johnson (2008, p.149). Age, gender, ethnicity, and financial aid eligibility did not show any significant differences (Aragon & Johnson,

2008) , whereas GPA (Grade Point Average) showed higher differences in completers and non-completers.

6.5 Students' perceptions of online learning

Generally speaking, students show a positive attitude towards online learning from moderate to a high level of satisfaction (Rodriguez, 2008). A study suggests, students who were not satisfied with online learning techniques as compared to traditional ones, told that lack of community element was the reason for their dissatisfaction (Perry & Pilati, 2011). Students complained about very less presence of instructors in online courses and needed to teach themselves instead of getting help from instructors (Jaggars S. S., 2014).

The flexibility and cost-ineffectiveness due to increased prices of gasoline in Virginia(US), online learning showed a huge positive impact on higher education (Perry & Pilati, 2011; Jaggars S. S., 2014). Few students believe that online courses provide them the superior quality of education. A survey was conducted on students from 2 Community Colleges of Virginia comparing face-to-face and online learning, and it was concluded that only 3% of students admitted that they learn more in online mode than face-to-face. In some cases, students do not take a course in which their peer has a negative experience, either they experienced issues from technical problems or due to a reduced sense of instructor (Jaggars S. S., 2014).

In a study conducted on students enrolled in at least one online course, at two of Virginia community colleges, students showed different perceptions regarding online and face-to-face learning. Some students complained that, in face-to-face learning, instructors keep lecturing continuously, and no one asks a single question (Jaggars S. S., 2014) (Rodriguez, 2008). Students keep saying that they can finish assignments more quickly if they are permitted to skip the in-class portion of the course. Few students put forward their personal thoughts regarding the distraction and disturbance they felt from other students in face-to-face sessions. On the other hand, only a handful of students think that online courses are way more efficient to learn course material effectively. In contrast, others found them difficult, time-consuming, and challenging (Jaggars S. S., 2014).

Jaggars (2014, p.31) stated that students who found online learning better than face-to-face, are those who felt they could finish assignments quickly by skipping in-class portions and students who were single parents, said that, they would like to take all courses online if it could be possible. General reasons to take face-to-face courses are maintaining a connection to campus and peers, and better student-instructor connection. Face-to-face approach helps students to get answers quickly rather than wait for a reply that is distant, less personal, less immediate, less detailed, and less solid from the instructor, to whom you don't know, or never has been interacted (Jaggars S. S., 2014).

Students choose interacting approaches according to the academic subject area, whether it is easy or difficult, and interesting or important (Jaggars S. S., 2014). Most

students choose difficult, important, and interesting courses with face-to-face approaches whereas easy courses online. Moreover, subjects (mathematics and science) with practical or lab work, and language (English, French, Spanish) are taken as difficult, so students avoid taking them online as they cannot perform and practice online (Jaggars & Bailey, 2010; Perry & Pilati, 2011)

6.6 Roles of teachers and instructors in online learning

A sense of community is required to fill spaces for a face-to-face approach. Teachers and instructors play a vital role in filling those spaces. It must be ensured by the instructors that time spent to produce material is well spent and material produced should be qualitative. As "Removed due to copyright restriction " (Perry & Pilati, 2011) so qualitative support should be provided to the teachers and students as well during the delivery of online classes. From the development, of course, until delivery, teachers are associated with the courses either in designing or teaching (Keengwe & Kidd, 2010).

In online learning, online instructor's roles are categorized as pedagogical, social, technical, managerial (Keengwe & Kidd, 2010; Coppola, Hiltz, & Rotter, 2002), facilitator, mentor, organizer, role model, coach, supervisor, problem solver, and liaison. The pedagogical and social role involves educational facilitation and creation of a friendly social environment, respectively, as the managerial role includes objective and agenda-setting, rule and decision making, et cetera (Keengwe & Kidd, 2010). Processes like learning, thinking, editing, responding to questions, and analysing information are handled by cognitive roles (Coppola, Hiltz, & Rotter, 2002). For an effective online instructor, it is necessary to shift pedagogical practices to achieve appropriate skills (Keengwe & Kidd, 2010).

Several responsibilities belong to teachers include facilitating, establishing and maintaining discourse (read and comment on students' forums); encouraging and supporting students; setting learning environment and agreed-on objectives; provide explanatory feedback; diagnosing misconceptions and respond technical problems (Coppola, Hiltz, & Rotter, 2002; Keengwe & Kidd, 2010).

According to Paloff and Pratt (2002, pp.21-23), "Removed due to copyright restriction" and "Removed due to copyright restriction" (Paloff & Pratt, c2001) as cited by (Keengwe & Kidd, 2010)

6.7 Are there any differences in different modes of learning?

Caldwell (2006) conducted a study with a programming language (C++) and randomly assigned 20 students in each group with different learning approaches: face-to-face, web-assisted (all material online but face-to-face labs) and online. The students with an online approach had only an email option to communicate with teacher and group forums to interact with other students. Cavus, Uzunboylu, and Ibrahim (2007) conducted a similar study with Java programming with face-to-face, online with standard collaboration tools and online with advanced collaboration tools approaches and 18 students assigned randomly, to three approaches in each group. Online students

had synchronous communication for 2 hours each week. The withdrawal rate in both studies was 0%. In both studies, not enough differences were seen except online, with advanced collaboration in the second study performed well.

7 Brief description of the literature review

	Paper title	Authors	Mode of learning	Activities, factors, and Material used	Participants	Conclusion
1	E-learning for self-management support: introducing blended learning for graduate students – a cohort study	Virginia Munro, Andrea Morello, Candice Oster, Christine Redmond, Anna Vnuk, Sheila Lennon, and Sharon Lawn	Face-to-face, online learning, blended approach	Feedback session, care plans	Students enrolled in Masters of Physiotherapy and Graduate Entry Medical program at different campuses of Flinders university	Students in the blended group showed the greatest results
2	Online distance learning and music training: benefits, drawbacks, and challenges	Theano Koutsoupidou	Online Distance Learning	Questionnaires	Tutors, instructors, lecturers	Requirements like instrumental technique, listening, conducting, participation in choirs could create limitations in ODL.
3	Applying the Technology Acceptance Model to Online Learning in the Egyptian Universities	Taher Farahat	Online Learning	SI, PEU, PU, ATT, BI, Likert scale	Undergraduate students in DBMU	For ATT, 52.5% of participants showed negative attitudes towards online learning; for PU, 55% of participants could not conceive its usefulness; for PEU, 51.6% of participants do not perceive OL easy

						in use; 60% of participants do not have BI.
4	Choosing Between Online and Face-to-Face Courses: Community College Student Voices	Shanna Smith Jaggars	Online and face-to-face	In-person interviews	47 Students of two Virginia community colleges enrolled in at lowest one online course	Students do not want to take a risk with online courses and consider face-to-face, a better approach
5	A Comparative Study of Three Instructional Modalities in a Computer Programming Course: Traditional Instruction, Web-based Instruction, and Online Instruction	Caldwell, Elvira	Face-to-face, web-assisted, online	The programming language C++, six outcomes measured examinations, two multiple-choice midterm exams, three programming assignments, and a final exam	Students	No significant difference was seen
6	Assessing the Success Rate of Students Using a Learning Management System	Cavus, Nadire ; Ibrahim, Dogan	Face-to-face, online standard collaboration tools, online	N/A	Students	No significant difference was seen

	Together with a Collaborative Tool in Web-Based Teaching of Programming Languages		with advanced collaboration tools			
7	Factors Influencing Completion and Noncompletion of Community College Online Courses	Steven R. Aragon & Elaine S. Johnson	Online learning	N/A	305 students from a rural community college in the mid-western United States	Demographics as age, gender, ethnicity, and financial aid ability did not show any significant differences between completers and non-completers, whereas GPA showed. Personal time issues, course design and communication, technology, institutional issues, and learning preferences were the factors that restrict non-completers towards studies.
8	Towards Best Practices in Online Learning and Teaching in Higher Education	Jared Keengwe; Terry T. Kidd	Online learning	Literature review, Responsibilities of teachers and instructors	N/A	Although instructors have responsibilities of socializing, encouraging students, designing courses, still all of them are not suited for online environments.

Table 1 Brief description of literature review

8 Methodology

In this section, the delivery approaches, and the site, from where data is extracted, has been stated. Flinders University uses FLO (Flinders Learning Online) that needs a FAN (Flinders Authentication Name) and password to log in into Okta dashboard. Okta creates a single layer that connects users together with their services, so they can focus on the students' futures ("Flinders University", 2020). The focus of this research is the comparison of interactions made by face-to-face and online students to access the course material that instructors provide them on FLO. FLO can be accessed from any part of the world using FAN and password. In this report, number of interactions made by each student for different modules has been calculated. Additionally, interactions made in 2018 and 2019 has been compared for same modules. The findings were categorized according to total IPS with the topic (unrestricted to academic period), hourly and weekly (restricted to academic period).

The methodology of this observational study has been performed using log reports of the students generated using FLO, enrolled in COMP1711_S1_2018 and COMP1711_S1_2018_DE for 2018 and COMP1711_8711_ 2019_S1_U + DE for DE, GE and U approaches in 2019 provided by the project supervisor. The information was extracted using pivot tables in excel. These pivot tables were further used to make tables for IPS that were observed and analyzed to give results.

FLO allows instructors to generate reports regarding the interactions made by students to access materials or to perform actions like submissions, quizzes, tutorials etc. There were total of 6 tutorials throughout the semester from week 2 to week 10. The SCORM package videos are recorded for chapters in course material individually. In this analysis, 16 modules have been added which are common in 2018 and 2019. Two modules regarding Relational Algebra have been discarded from 2019 data set as these were not present in 2018 data set, for better data analysis. Moreover, the data regarding Topic Introduction and explanation of Statement of Assessment Method was not present in 2019 data set but in 2018 only. The practical course material refers to the SQL material that was explained in pre-recorded videos to give better idea.

Moreover, the reflection quizzes are meant for students to know what they have gained from some of the individual chapters and SQL practicals from course material. There were 13 reflection quizzes in total. Also, there were 8 practical quizzes each of which had 2 tasks (except practical 1 that had only 1 task), where each task named as a checkpoint. Therefore, practical quizzes had 15 checkpoints in total. Additionally, External tools include assignment extension, Oral Examination portal (collaboration tool for structured examination portal) and statement of assessment methods. Assignment extension, as the name suggests is the tool to extend the submission for an assignment. It is a type of email structure in which a request can be made and allows to attach documents by browsing or drag and drop. The statement of assessment

methods gives details about number of submissions on what day and time including the weightage of the submission for entire topic or course.

The F2F notes were the material used to teach for in-class students (while face-to-face session). On the other hand, material as pdfs was the additional material provided to students for better guidance. In addition, assignments are different pieces of assessments for the students. The last module was muddiest point made for students to provide feedback to the topic coordinator. Students could give their feedback depending on how easy or difficult was a task or explanation of material provided by topic coordinator. The muddiest point data for 2019 was not interesting, so data for 2018 is compared only.

Total number of students enrolled in 2018 and 2019 were 111 and 261 respectively. In 2018, 100 students were enrolled in face-to-face and 11 were enrolled in distance education (DE) approach. In 2019, 38 students were enrolled in DE, 50 students enrolled in graduate entry (GE) and 173 were enrolled for undergraduate course. The total number of interactions made in 2018 were 179439 where face-to-face students made 161124 and DE students made 18315 interactions. In 2019, 283991 interactions were made in total out of which 2019_DE, 2019_GE and 2019_U students made 51209, 57070 and 175712 interactions, respectively. Further, 2018_F2F and 2019_U belongs to face-to-face category, 2018_DE and 2019_DE for distance education (online education) and 2019_GE for graduate entry.

9 Research findings

The data has been extracted in three types as shown below

a) Type 1: Number of IPS in various modules (9.2)
b) Type 2: Number of IPS in an hour (9.3)
c) Type 3: Number of IPS in a week (9.4)

The calculated data is shown by tables and graphs for easy analysis. For type 2 and type 3, red dots are used to mark up the highest IPS.

9.1 Information regarding data sets

The figure below shows the total number of students in each group and total interactions made by each group. It can be clearly seen that the interactions per student (IPS) are highest for DE students in 2018 and 2019 followed by face-to-face students in 2018 whereas lowest interactions have been made by undergraduates in 2019(2019_U).

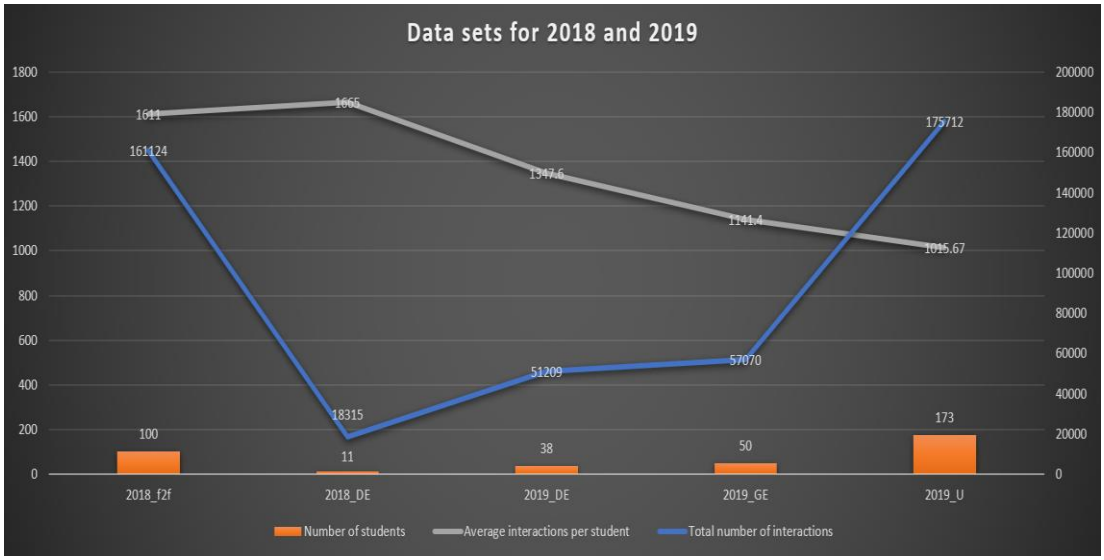


Figure 9.1. 1 Data sets for 2018 and 2019 for all groups

9.2 Number of IPS in various modules

The modules in the thesis are different types of material provided (pdfs, videos) and activities(different quizzes) needed to perform. The IPS were observed for total 9 modules as shown below

1. Tutorial files (6)
2. Course material as videos
    a) Theoretical Course Material (16 files)
    b) Practical course material (13 files)
3. Reflection quizzes (13 quizzes)
4. Practical quizzes (15 checkpoints)
5. External tools (SAM, assignment extension requests, Oral Examination portal)
6. Material as F2F notes (17 files)
7. Material as pdfs
    a) Theoretical Course Material (12 files)
    b) Practical course material (12 files)
8. Assignments
9. Muddiest point (feedback)
    a) Theoretical Course Material (11files)
    b) Practical course material (9 files)

9.2.1 Interactions with tutorial files

From figure 9.2.1, total 6 tutorials were offered to the students in both years, 2018 and 2019. The highest number of IPS were 9.05 made by 2019_DE students in fourth week followed by same with 8.61 IPS in first week.

After 2019_DE students, 2018_DE students made highest interactions in all weeks except fourth and tenth week. 2018_F2F students made third highest interactions whereas 2019_U students made lowest interactions in all six weeks from 0.73 to

approximately 2 IPS. 2019_DE students made highest and 2019_U students made lowest interactions for tutorial 1.

2019_GEs and 2019_U showed lowest interactions for tutorial 2 and tutorial 3 which are approximately 2 IPS. For tutorial 4, highest interactions were made by 2019_DE but all other groups made approximately 1 or 2 IPS. Similarly, for tutorial 5 and tutorial 6, showed 4 and 3 IPS.

Additionally, 2019_DE students made highest interactions in all 6 weeks and 2019_GE students made lowest interactions except week 6 by 2018_DEs.

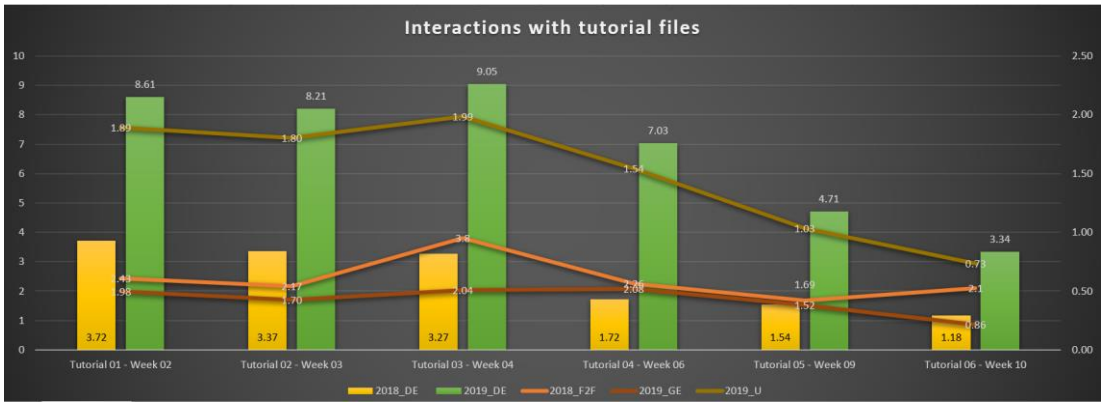


Figure 9.2. 1 Total number of interactions with tutorial files by all groups

All in all, students made most of the interactions in first three tutorials and gradually decreases till last tutorial. The lowest interactions were made by 2019_U students with tutorial 6 which were 0.73 IPS.

9.2.2 Interactions with course material by means of videos

9.2.2.1 Interactions with theoretical course material's videos

SCORM package FLO Overview gives an overview of the FLO topic page for COMP1711 which detailed about where to find things as seen in figure 9.2.2. HowToUnilife is a brief reflection on a study that looked at perceptions of the first year university students. It had insights about expectations for being a university student. Topic Introduction video introduced to the topic covering topic's aims, textbook, software, and about topic coordinator. Explanation of the SAM explained the Statement of Assessment Methods. Other videos, as the names suggests, are regarding chapters of the course material.

Firstly, in SCORM package (course material) videos, 2018_DE students interacted to Topic Introduction and Introduction to Database (chapter 1) with highest number of IPS which were 14.55 and 12.27. Approximately 7 interactions were made for Database Environment, database architecture, database software development cycle, ER Modelling I and Logical Modelling.

Nearly 6 IPS were made for explanation of SAM, FLO Overview and Logical Modelling II. Students interacted with Enhanced ER Modelling and ER Modelling II

almost 5 times. Videos regarding HowToUnilife, Normalization I and Normalization II were seen nearly 4, 3 and 2 times, respectively.

Secondly, 2019_DE students interacted with Introduction to Database, Logical Modelling and FLO Overview, the most. On the other hand, lowest interactions were made with database architecture, HowToUnilife and Normalization II.

Thirdly, 2018_F2F students made second highest interactions with Topic Introduction and Introduction to Database. Nearly, 5 or 6 interactions were made for FLO Overview, Database Architecture and Web, Database Environment, Database Software Development Lifecycle, ER Modelling I, Logical Modelling , Logical Modelling II and Normalization I. 2018_F2F students interacted lowest with explanation of SAM and few last chapters of the course material.

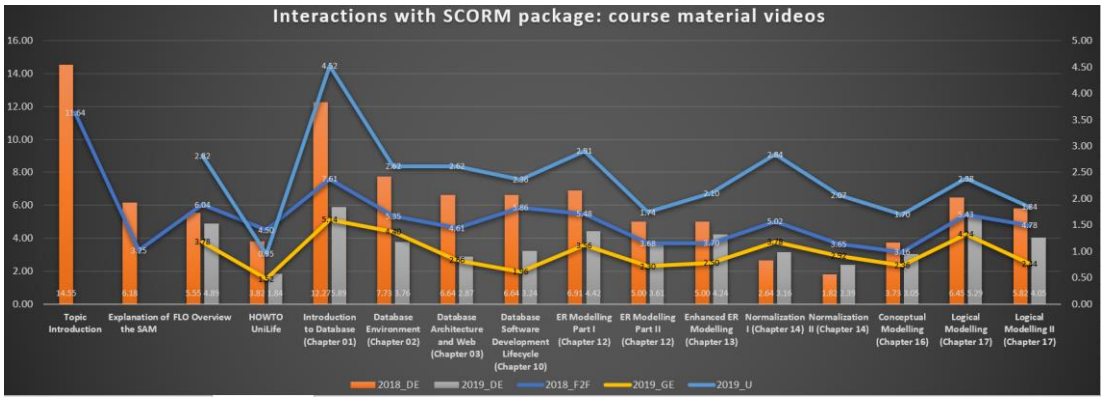


Figure 9.2. 2 Total number of interactions with theoretical course material's videos by all groups

Lastly, 2019_GE and 2019_U students showed fluctuating and lowest interactions with course material videos. Their interactions with FLO Overview and Normalization I were 3.78 and nearly 2.82, respectively. Students interacted highly with Introduction to Database. Nearly 1, 2 or 3 IPS were seen in other modules by 2019_GE and 2019_U.

Overall, all five groups of students made highest interactions with Topic Introduction and Introduction to Database which is the first chapter of the course. 2018_F2F, 2019_GE and 2019_Us made parallel interactions but change in figures. Also, 2019_U students made lowest IPS which were 0.95 with HowToUnilife.

9.2.2.2 Interactions with practical course material's videos

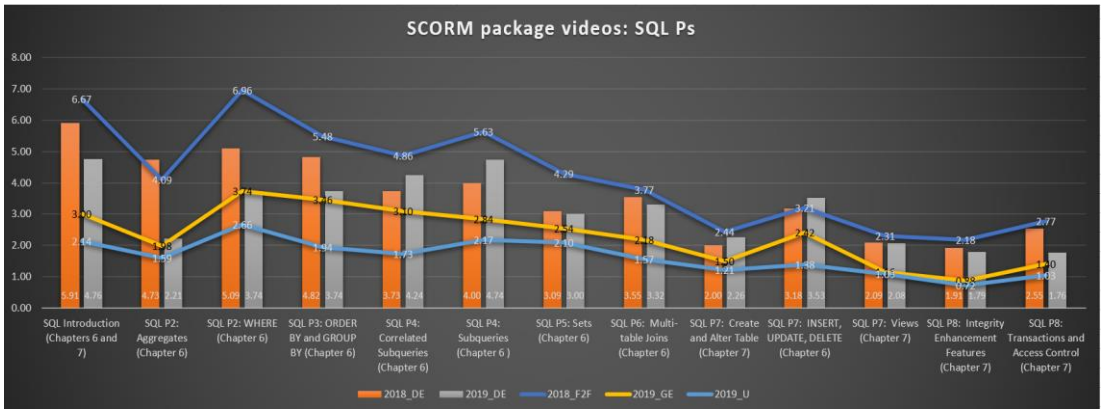


Figure 9.2. 3 Total number of interactions with practical course material's videos by all groups

In this section, 2018_F2F students made highest interactions in all 13 modules as clear from figure 9.2.3. In first module (SQL Introduction), nearly 6.67 IPS were seen as it decreases to 4.09 in SQL P2: Aggregates module. It again rises near to 7 IPS in SQL P2: WHERE module and fell to 5.48 and 4.86 in SQL P3: ORDER BY and GROUP BY module and SQL P4: Correlated subqueries module, respectively. It rose to 5.63 in SQL P4: Subqueries module and then gradually decreased till SQL P7: Create and Alter table module which was 2.44. After a small rise in SQL P7: INSERT, UPDATE, DELETE module, it was minimized to 2.31 and 2.18 in SQL P7: VIEWS and SQL P8: Integrity Enhancement Features module and rose to 2.77 in SQL P8: Transactions and Access control module.

For 2018_DE second highest interactions in first four modules which were 5.91, 4.73, 5.09, 4.82 and it fluctuates from SQL P4: Correlated Subqueries module till last. Almost 2, 3 or 4 interactions were made for other modules. On the other hand, 2019_DE students made highest and almost similar interactions in SQL Introduction module and SQL P4: Subqueries module, lowest and similar in SQL P8: Integrity Enhancement Features module and SQL P8: Transactions and Access Control module. In SQL P2: Aggregates module, it fell to 2.21 and rose to 3.74 in SQL P2: WHERE and SQL P3: ORDER BY and GROUP BY module. An increment was seen in SQL P4: Correlated Subqueries module that was 4.24 and decremented to 3 in SQL P5: SETS module. Similar interactions were made in SQL P6: Multitable Joins and SQL P7: INSERT, UPDATE, DELETE module which were 3.32 and 3.53 whereas SQL P7: Create and Alter table module and SQL P7: VIEWS module showed 2.26 and 2.08 IPS.

2019_GEs showed 3 IPS in SQL Introduction module and decreased to 1.98 in consecutive module which was SQL P2: Aggregates. It was highest in SQL P2: WHERE module which was 3.74 and gradually decreases to SQL P7: Create and Alter table module by 1.50 interactions. After a slight increment to 2.42 for SQL P7: INSERT, UPDATE, DELETE module, it fell off to 0.88 and softly increased to 1.40 in last module which was SQL P8: Transactions and Access Control.

2019_U batch showed lowest interactions for all modules. It seems to be parallel but less than 2019_GE. 2.14 interactions made for SQL Introduction module and 1.59 for SQL P2: Aggregates module. 2019_U students made highest interactions in SQL P2: WHERE module. For rest of the modules, fluctuations can be seen clearly. The series of interactions made from SQL P3: ORDER BY and GROUP BY to SQL P7: Views module is 1.94, 1.73, 2.17, 2.10, 1.57, 1.21, 1.38 and 1.09. 2019_Us made lowest interactions in SQL P8: Integrity Enhancement Features module whereas 1.03 interactions were noted for SQL P8: Transactions and Access Control module.

Overall, 2018_DEs and 2018_F2Fs made highest interactions for all modules except a few whereas 2019_Us made lowest interactions with SQL P8: Integrity Enhancement Features, noted. 0.72 IPS.

9.2.3 Interactions with reflection quizzes

All the five groups of students made highest interactions with first quiz (background to databases) as seen in figure 9.2.4. 2018_DE students made 59.18 IPS followed by 2018_F2F which were 49.61 IPS. After that, 2019_GE showed 34.02 and 2019_U made 22.86 interactions. Lastly, 2019_DEs made 22.32 IPS. Second quiz (Conceptual DB Design) came up with sudden decrease in interactions to 14.73 by 2018_DE followed by 12.49 and 12.36 by 2018_F2F and 2019_GE, respectively. 2019_DEs showed 7.53 and 2019_Us made lowest interactions for second quiz which were 5.28.

For database software development life cycle, 2018_DE students made 18 IPS, 2018_F2F made 14.79 and 2019_DEs made lowest interactions by 5.21 per student. In fourth quiz (EER Modelling), interactions by all groups were die down that were noted as 9.27, 4.26, 7.45, 6.22 and 5.21 by 2018_DE, 2019_DE, 2018_F2F, 2019_GE and 2019_U respectively.

In fifth quiz (ER Modelling), interactions boosted and fall off again in sixth quiz (Logical Modelling). The change noted in fifth (ER Modelling) and sixth quiz (Logical Modelling) was from 41.73 to 13.45, 17.71 to 7.66, 39.44 to 13.49, 33.16 to 11.40, 14.72 to 4.39 for 2018_DE, 2019_DE, 2018_F2F, 2019_GE and 2019_U respectively.

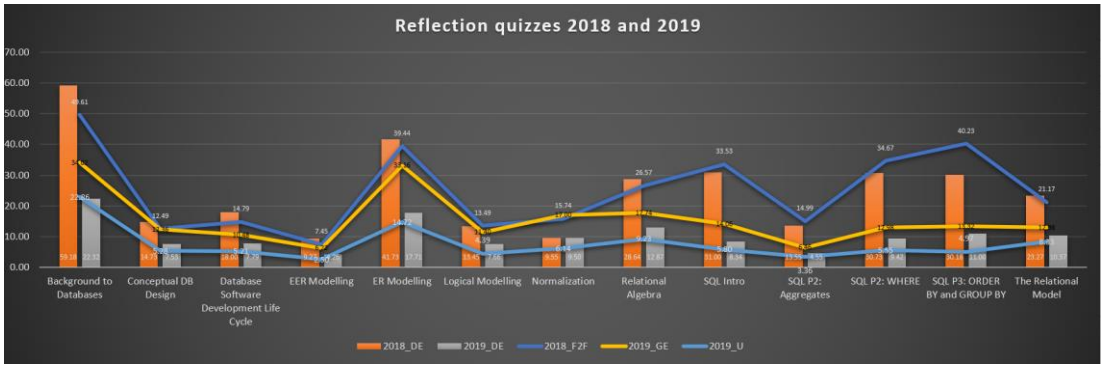


Figure 9.2. 4 Total number of interactions with reflection quizzes by all groups

In Normalization quiz, some groups' interactions increased while others decreased slightly. Eighth quiz (Relational Algebra) again showed huge climb for 2018_DE and

2018_F2F. On the other hand, rest of the groups showed figures close to previous quiz (Normalization).

Additionally, eleventh (SQL P2: WHERE) and twelfth quiz (SQL P3: ORDER BY and GROUP BY) have similar figures for 2018_DE which were 30.73 and 30.18. 2019_DEs interacted 34.67 times per student with eleventh quiz (SQL P2: WHERE) and elevated to 40.23 in next quiz (SQL P3: ORDER BY and GROUP BY) which again decreased in final quiz (The Relational Model). 2019_GEs and 2019_DEs showed nearly equal interactions for last three quizzes.

Overall, the reflection quizzes were interacted highly by 2018_DE, noted 59.18 IPS whereas lowest interactions were 2.50 IPS made by 2019_U.

9.2.4 Interactions with practical quizzes

Figure 9.2.5 shows, in practical checkpoint 1, 2018_DE students made 35.27 interactions which were highest followed by 29.35 by 2018_F2F. 2019_DEs and 2019_Us made similar number of interactions that were approximately 19. Lowest interactions for checkpoint 1 were made by 2019_GEs that were 17.62 IPS.

2018_DEs and 2019_DEs made higher interactions in checkpoint 3 than checkpoint 2, noted as 17.36 and 25.47. 2019_GE and 2019_U made less interactions in checkpoint 3 which were noted as 18.7 and 20.49, respectively. Although, 2018_F2F made almost similar interactions in checkpoint 2 and checkpoint 3.

Again, an increment was seen in interactions for checkpoint 4. 2019_DE students made more interactions than 2018_DE that were 29.63 but 2018_F2F students made highest interactions for this checkpoint. 2019_U students made 24.29 whereas 2019_GE made 22.9 interactions. All groups except 2019_U showed decrease in interactions in checkpoint 5 than checkpoint 4.

2019_DE, 2019_U and 2019_GE showed nearly same interactions for both checkpoint 6 and checkpoint 7. On the other hand, 2018_F2F and 2018_DE interacted less in 7 than checkpoint 6.

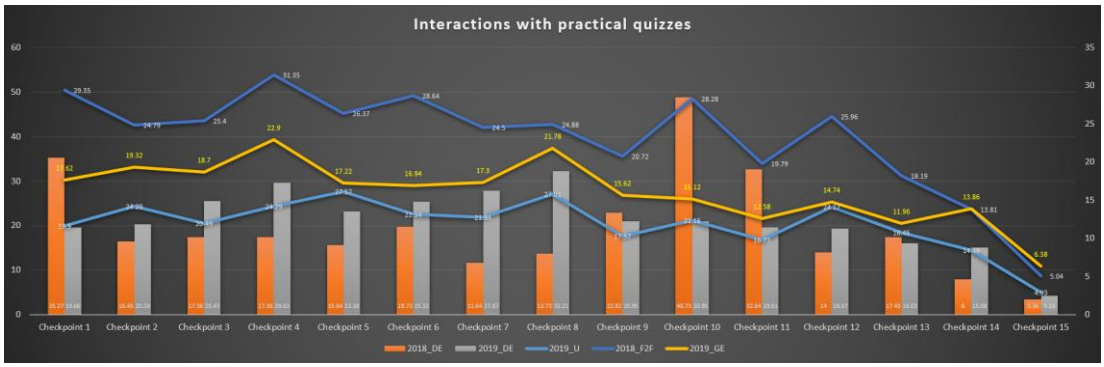


Figure 9.2. 5 Total number of interactions with practical quizzes (checkpoints) by all groups

In checkpoint 8 and checkpoint 9, 2019_DE made almost double interactions than 2018_DE. 2019_U students made 27 IPS, second highest after 2019_DE. Lowest interactions were noted for checkpoint 9 that were 15.62. 2019_DE and 2018_F2F

seemed to have nearly same interactions, 20 per student in checkpoint 9. 2019_U, 2018_F2F and 2019_GE's interactions were minimized in checkpoint 9 from 27.01 to 17.57, 24.88 to 20.72 and 21.78 to 15.62, respectively.

2018_DE interacted to checkpoint 10 by 48.73 interactions whereas 2019_DE's interactions were less than half of 2018_DE's. Surprisingly, 2018_DE's interactions were decreased in checkpoint 11 but 2019_DEs showed similar as of checkpoint 10 for checkpoint 11 as well.

Moreover, all groups interacted less in checkpoint 13 than checkpoint 12. Similarly, in checkpoint 13, all groups showed less interactions than checkpoint 12 except for 2018_DE which made more interactions in checkpoint 13.

Lowest interactions were seen in both quizzes for last practical by all groups. 2018_DE, 2019_DE, 2018_F2F, 2019_GE and 2019_U showed decrement as 8 to 3.36, 15.08 to 4.18, 13.81 to 5.04, 13.86 to 6.38 and 14.46 to 4.93, respectively.

Overall, highest interactions were shown by 2018_DE for checkpoint 10 which were 48.73 IPS. On the flip side, lowest interactions made by all groups for checkpoint 15, and were less than 7 IPS.

9.2.5 Interactions with external tools

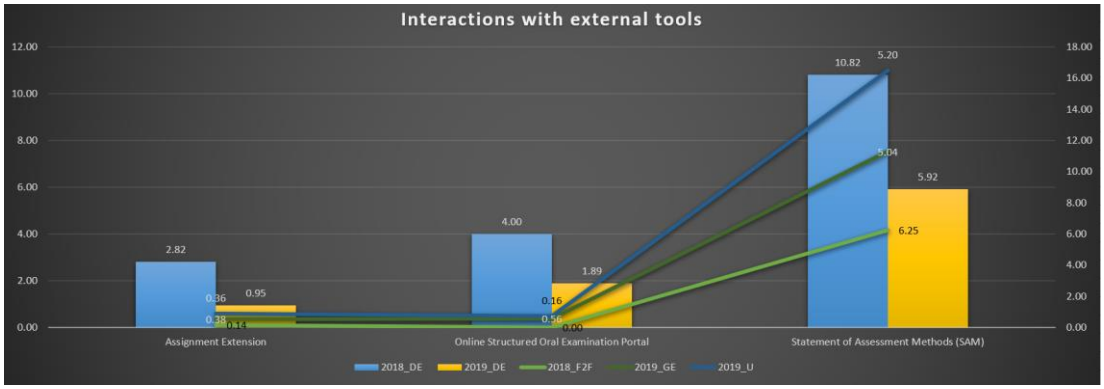


Figure 9.2. 6 Total number of interactions with external tools by all groups

2018_DE and 2019_DE students made highest interactions with SAM that were 10.82 and 5.92 IPS as clear from above figure 9.2.6. For Oral Examination portal, 4 and 1.89 interactions were made whereas 2.82 and 0.95 were the lowest interactions made by same for an assignment extension.

Moving on to 2018_F2F and 2019_GE, 6.25 and 5.04 interactions were made for SAM. Almost nil interactions were noted for assignment extension and Oral Examination portal by 2019_U, 2018_F2F and 2019_GE. A figure of 5.20 was noted for SAM by 2019_U.

All in all, the highest interactions in external tools were made for SAM by 2018_DE, 10.82 IPS whilst lowest IPS were 0.14 with assignment extension by 2018_F2F.

9.2.6 Interactions with F2F notes

2018_DE students made highest interactions in the beginning that were 2.73 IPS seen in figure 9.2.7. It decreased to 1.82 and again increased to 2.09 IPS. after a fall to 0.91, it showed null interactions for F2F 03 and F2F 03 notes. F2F 04 showed 1.82 interactions followed by 1.55 IPS by F2F 04 notes. F2F 06 invoices and F2F 06 library comes with null interactions but F2F 06 notes comes with 0.64 IPS. Again, a huge increment can be seen in F2F 07 with 2.73 interactions that decreased to 1.18 and 0.55 by F2F 09 notes and F2F 10a notes, respectively. F2F 11 and F2F 11 notes showed nearly similar interactions that were 2.55 and 2.36.

2019_DE students showed 1.00 and 0.71 IPS for F2F 01 and F2F 01 notes that decreased to 0.58 in F2F 02. After decreasing to 0.24 and 0.29 in F2F 03 and F2F 03 notes, it rose to 0.53 and 0.37 in F2F 04 and F2F 04 notes, respectively. F2F 06 invoices and F2F 06 library comes with 0.95 and 0.53 IPS. After rising and falling few times, F2F 10a notes showed 1.08 IPS whereas 2019_DE students did not interact with F2F 11 and F2F 11 notes.

2018_F2F students showed 1.98 IPS with F2F 01. It decreased to 1.54 and 1.31 in F2F 01 notes and F2F 02. 2018_F2F did not interacted with F2F 03, F2F 03 notes, F2F 06 invoices and F2F 06 library. Similar number of interactions were seen for F2F 04 and F2F 04 notes that were 0.97 per student and then decreased to 0.80 for F2F 06. For 2018_F2F, second highest interactions were 1.82 noted for F2F 07 that fell dramatically to 0.48 IPS for F2F 09 notes. A few ups and downs were seen further for 2018_F2F.

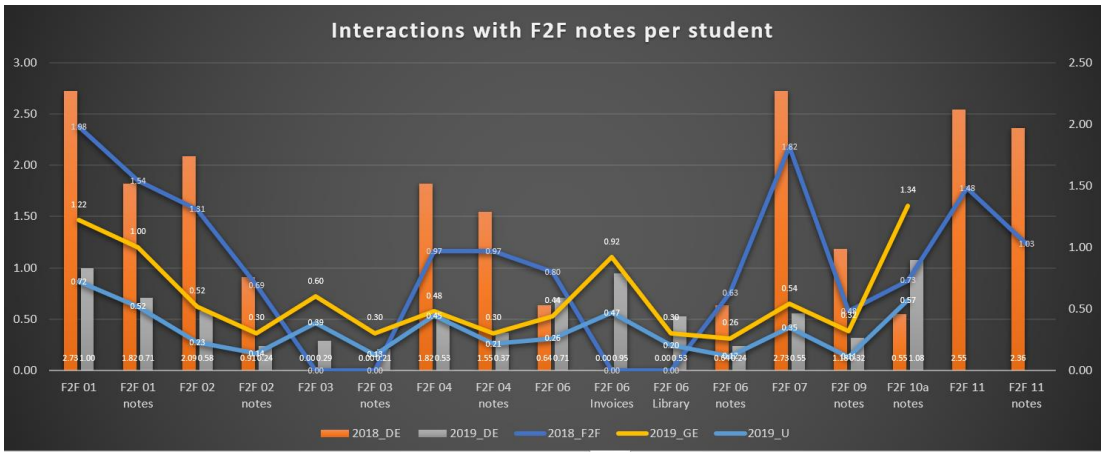


Figure 9.2. 7 Total number of interactions with F2F notes by all groups

2019_GE students showed IPS in between 0.26 to 1.34 that was a zig-zag path. The highest interactions were noted in the beginning and end for F2F 01 and F2F 10a notes. 2019_GE students did not interact with F2F 11 and F2F 11 notes.

The highest IPS showed up for F2F notes were 2.73 with F2F 01 and F2F 07 by 2018_DE while the last group, 2019_U, showed lowest IPS between 0.11 to 0.72 in most of the notes.

9.2.7 Interactions with course material by means of pdfs

9.2.7.1 Interactions with theoretical course material chapters' pdfs

2018_DE students' initial interactions were 2.27 per student that first increased to 2.55 and then decreased to 1.55 and 1.27 IPS in figure 9.2.8. It rose to 3.64 IPS for the Relational Model and showed similar interactions for Relational Algebra and Database Software Development Lifecycle. Nil interactions were made for ER Modelling, but 2.82 IPS were made for EER Modelling. It decreased to 2.09 for Normalization and 1.55 for Conceptual DB Design per student. For Logical Modelling II, 2.36 interactions were made by each student.

2019_DE students made 1.76 IPS in the beginning that increased to 1.89 for Introduction to Database. Database Environment and the Relational Model showed similar interactions, 1.24 per student whereas Database Architecture and Web had 1.13 IPS. It decreased to 1.05 and again increased to 1.08 IPS for Database Software Development Lifecycle. 1.92 interactions were noted for ER modeling whereas EER Modelling showed 1.29 IPS. Normalization and Conceptual DB Design showed 1.34 and 1.13 IPS. 2.13 interactions were seen for Logical Modelling II.

For Case study: University Accommodation Specification, 2018_F2F students made 1.69 IPS that incremented to 2.07; and decremented to 1.10 and 1.05 for Database Environment and Database Architecture and Web. It escalated to 2.84 in the Relational Model showing nearly similar interactions for next two units namely, Relational Algebra and Database Software Development Lifecycle. Nil interactions were seen for ER Modelling. Again 2.43 interactions were noted for EER Modelling and increased to 2.71 for Normalization. It fell off to 1.64 for Conceptual DB Design and climbed again to 3.45 in Logical Modelling II.

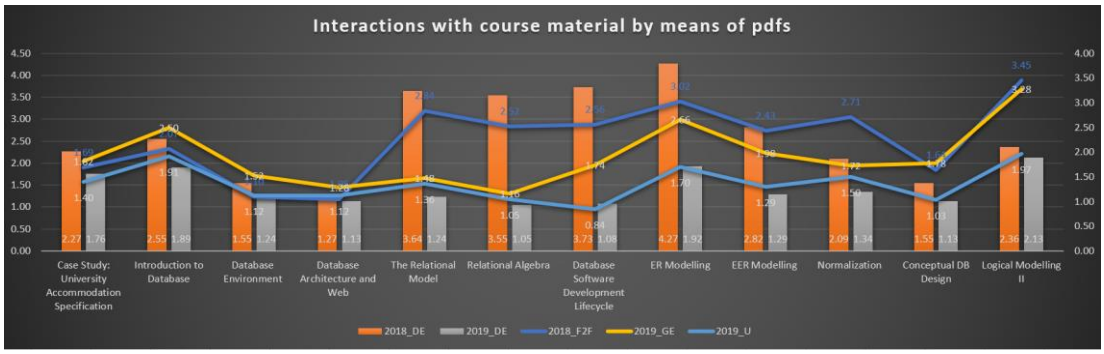


Figure 9.2. 8 Total number of interactions with theoretical course material chapter's PDFs by all groups

2019_U students interacted with all units and IPS lies between 0.84 to 1.97. The highest interactions were noted for last unit which was Logical Modelling II whereas lowest interactions were seen for Database Software Development Lifecycle. Overall, 2019_U showed zig-zag pattern.

2019_GE students showed 1.82 IPS for Case study: Accommodation Specification. It increased to 2.50 and continuously decreased to 1.52, 1.48 and 1.16 till relational algebra. Again, by incrementing, it rose to 1.74 and 2.66 IPS for Database Software

Development Lifecyle and ER Modelling, respectively. EER Modelling showed 1.98 interactions whereas Normalization showed 1.72. Conceptual DB Design had similar interactions to Normalization that were 1.78 which again heightened to 3.28 IPS in Logical Modelling II.

Overall, the highest IPS made with ER Modelling that were 4.27 by 2018_DE. On the flip side, the lowest IPS were 0.85 with Database Software Development Lifecycle by 2019_U.

9.2.7.2 Interactions with practical course material chapter's pdfs

For SQL Introduction in figure 9.2.9, 2018_DE students showed 3.09 interactions whereas 2019_Us showed lowest interactions that were 1.39 per student. In SQL P2: Aggregates, each 2018_F2F student interacted 3.11 times that was highest for this unit but 2019_DE and 2019 _U had similar number of interactions noted 1.47. 2019_GE interacted lowest of all for SQL P2: Aggregates. In addition to this, number of interactions rose to 3.91 by 2018_DE for SQL P2: WHERE followed by 2018_F2F noted as 3.54. 2019_GE again showed lowest interactions, 1.70 per student. These interactions decreased in SQL P3: ORDER BY and GROUP BY where highest interactions were shown by 2018_DE and lowest by 2019_GE and 2019_U.

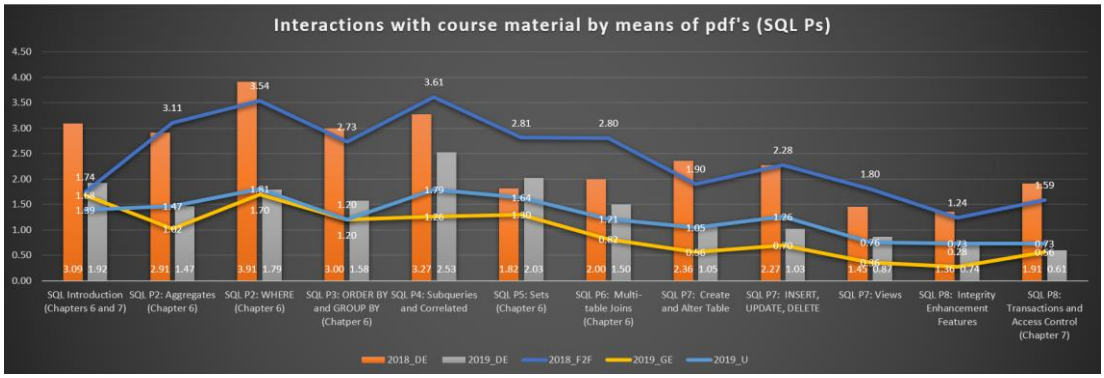


Figure 9.2. 9 Total number of interactions with practical course material chapter's PDFs by all groups

Interactions were decreased continuously in next four units by all groups except 2018_DE that showed increase in interactions. 2018_F2F interacted highly (2.28) with SQL P7: INSERT, UPDATE, DELETE followed by 2018_DE (2.27). 2019_GE showed lowest IPS noted, 0.70. Showing further decrease for SQL P7: Views by all groups, all groups showed similar or less interactions for last two units namely SQL P8: Integrity Enhancement Features and SQL P8: Transactions and Access Control except 2018_F2F and 2018_DE.

The highly interacted PDF in figure 9.2.9 was the SQL P2: WHERE by 2018_DE which was interacted 3.91 times as the lowest interacted PDF was SQL P8: Integrity Enhancement Features, 0.28 IPS, by 2019_GE.

9.2.8 Interactions with assignments

In Data Modelling Assignment Part I Hand-in of figure 9.2.10, 2018_DE students made 16.55 IPS closely followed by 2018_F2F,16.13 IPS. 2019_DE students had 5.66

whereas 2019_GE and 2019_U had 4.20 and 4.11 IPS, respectively. Nil interactions were noted for Data Modelling assignment part I- resubmission except 2019_GE students had 0.18 per student. 2018_F2F showed highest interactions for Part A (Data Modelling assignment part II) that were 12.63 followed by 2018_DE noted as 12.27. Other three groups showed interactions in between 2 to 3 per student.

For Part B (Data Modelling assignment part II), interactions decreased to 10.5 and 11.64 by 2018_F2F and 2018_DE, respectively. On the other hand, 2019_GE and 2019_U showed increment in IPS whereas 2019_DE had slight decrement.

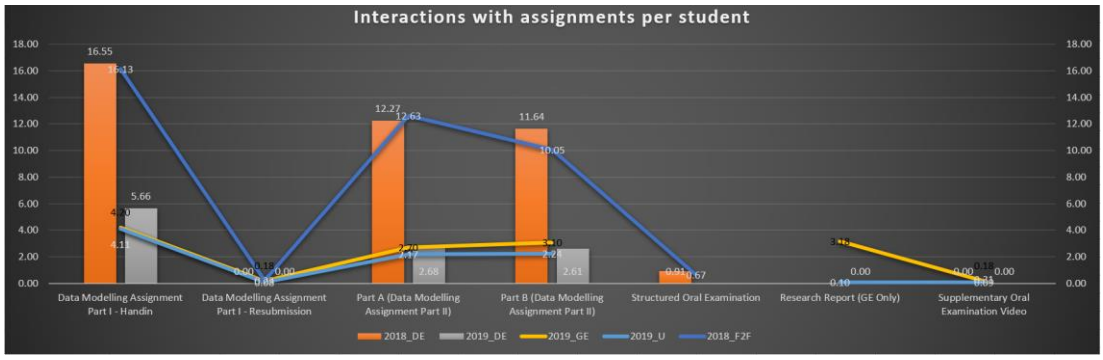


Figure 9.2. 10 Total number of interactions with assignments by all groups

2018_DE and 2018_F2F had 0.91 and 0.67 interactions whereas other groups had nil interactions for structured Oral Examination.

For research report (GE only), only 2019_GE students showed 3.18 IPS. Almost nil interactions were noted for supplementary Oral Examination video.

Overall, the highest IPS for assignments were 16.55 by 2018_DE with Data Modelling Assignment Part I-Handin whereas lowest IPS were 0.08 with Data Modelling Assignment Part I- Resubmission by 2019_U.

9.2.9 Interactions with muddiest point

9.2.9.1 Interactions with muddiest point for theoretical material provided

2018_F2F and 2018_DE students provided highest feedback for background to databases with 1.80 and 2 IPS as seen in figure 9.2.11. For Conceptual DB Design, 0.54 and 0.73 interaction per student were made by 2018_F2F and 2018_DE respectively whereas the interactions again increased for Database Software Development Lifecycle that were 0.67 and 1.09 IPS by2018_F2F and 2018_DE.

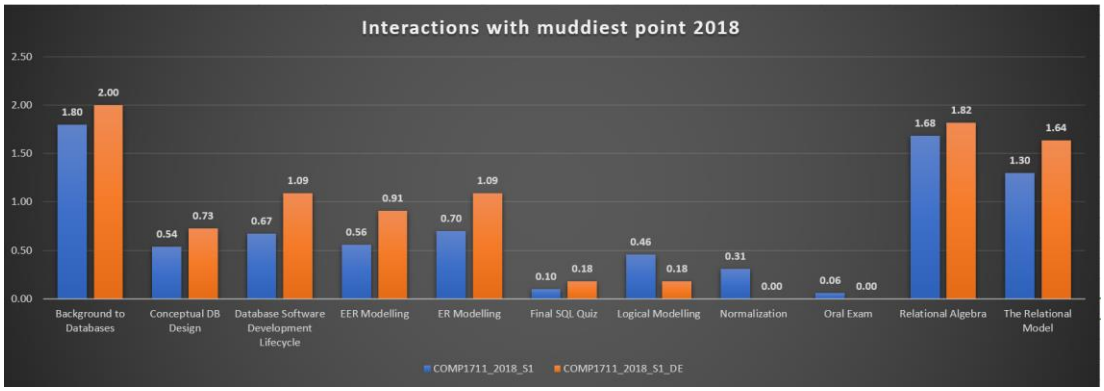


Figure 9.2. 11 Interactions with muddiest point for theoretical material provided

EER Modelling and ER Modelling was interacted 0.56 and 0.91; and 0.70 and 1.09 times by 2018_F2F and 2018_DE, respectively. The interactions again fell off to 0.10 and 0.18 for final SQL quiz whereas a small rise was seen for Logical Modelling that were 0.46 and 0.18 IPS by 2018_F2F and 2018_DE. Normalization and Oral Exam were interacted 0.31 and 0.06 times by 2018_F2F only whereas 2018_DE students did not interact with both at all.

For relational algebra, interactions escalated by 1.68 and 1.82 IPS by 2018_F2F and 2018_DE whereas the Relational Model also showed interactions close to it that were 1.30 and 1.64 IPS by 2018_F2F and 2018_DE, respectively.

All in all, the background to Databases interacted highly, noted 2 IPS by 2018_DE whereas Oral Exam was interacted least, noted 0.06 by 2018_F2F.

9.2.9.2 Interactions with muddiest point for SQL Ps

For SQL intro, 2018_F2F and 2018_DE both provided highest feedback that is both interacted 0.86 and 0.82 times per student shown in figure 9.2.12. For SQL P2: Aggregates, SQL P2: WHERE and SQL P3: order by and group by, 2018_F2F students interacted 0.79, 0.80 and 0.81 times whereas 2018_DE provided their feedback 0.73 times for all three.

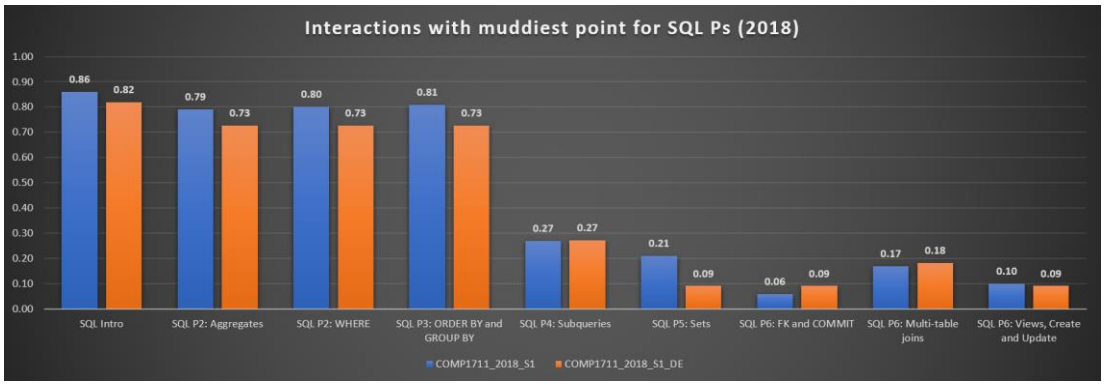


Figure 9.2. 12 Interactions with muddiest point for practical material provided

For SQL P4: subqueries, 2018_F2F and 2018_DE both showed 0.27 IPS whereas SQL P5: sets showed 0.21 and 0.09 IPS by 2018_F2F and 2018_DE respectively. 2018_F2F

showed lowest interactions with SQL P6: FK and COMMIT with 0.06 IPS as 2018_DE showed 0.09 IPS.

SQL P6: multi-table joins were interacted 0.17 and 0.18 times by 2018_F2F and 2018_DE. 0.10 and 0.09 interactions were made by 2018_F2F and 2018_DE with SQL P6: views, create and update.

Overall, the highest IPS were 0.86 by 2018_F2F with SQL Intro as lowest IPS were 0.06 with SQL P6: FK and COMMIT by same group.

9.3 Number of interactions by each group by means of time interval

In this section, data has been extracted according to the time that is at what time of the day students interacted with different modules. The time intervals taken here are one hour interval. The interactions noted at particular time say, 12am mean the number of interactions made between 12am and 12:59am per student.

Also, the comparison is done between all five groups for each sub-category. The explanation is done in descending order that is which group made highest interactions with the sub-category to the lowest one. The interactions less than one mean total number of interactions made were less than the number of students belong to that group. Also, highest and lowest IPS and total interactions made at time interval can be seen as well. The highest interactions have been highlighted with red color and lowest with yellow color in tables and graphs.

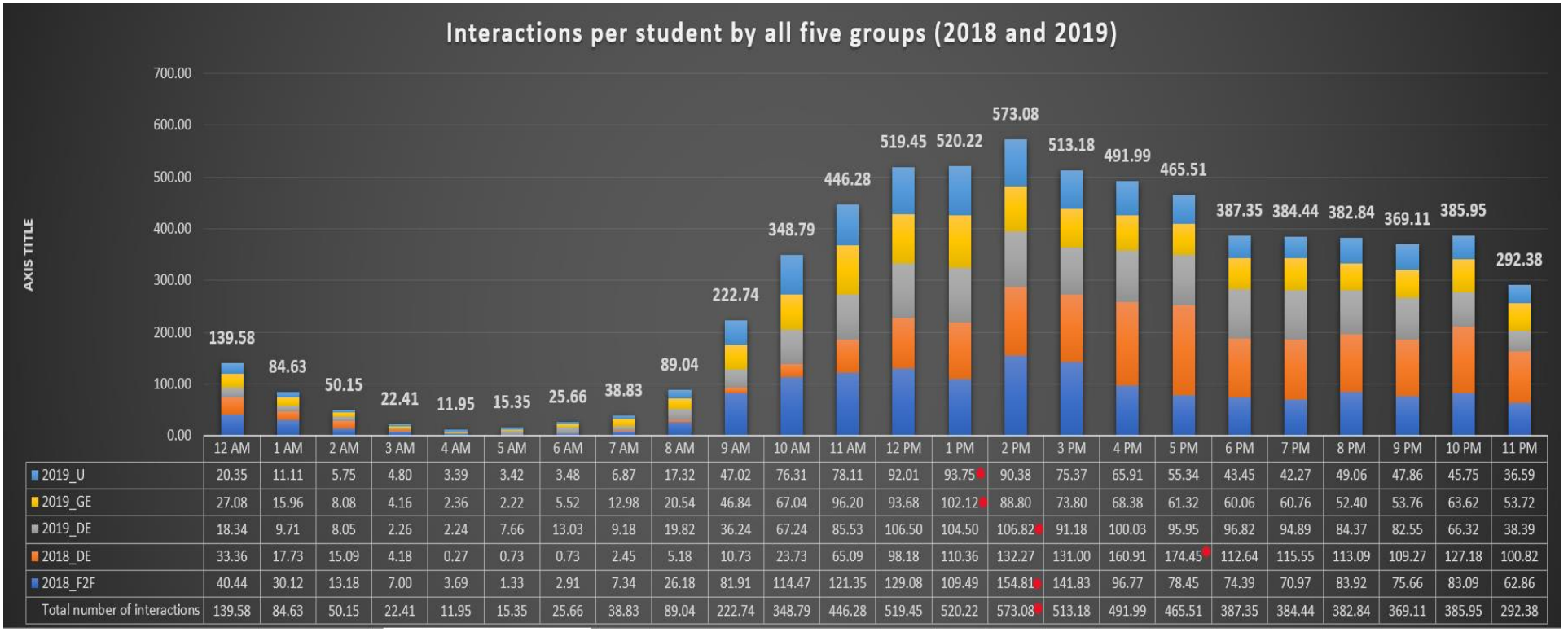
Moreover, the tables show IPS with each module by group. For the explanation and comparison, all the graphs included in each module have been used as the graph numbers are not referred in them.

9.3.1 Number of IPS by each group in particular time interval

It can be clearly seen that 2018_F2F students made lowest interactions between 2am and 7am whereas most interactions were made between 9am and 11pm. The highest interactions were made in the afternoon say, 2pm which were 154.81 IPS.

Groups	Total number of students	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
2018_F2F	100	40.44	30.12	13.18	7.00	3.69	1.33	2.91	7.34	26.18	81.91	114.47	121.35	129.08	109.49	154.81	141.83	96.77	78.45	74.39	70.97	83.92	75.66	83.09	62.86
2018_DE	11	33.36	17.73	15.09	4.18	0.27	0.73	0.73	2.45	5.18	10.73	23.73	65.09	98.18	110.36	132.27	131.00	160.91	174.45	112.64	115.55	113.09	109.27	127.18	100.82
2019_DE	38	18.34	9.71	8.05	2.26	2.24	7.66	13.03	9.18	19.82	36.24	67.24	85.53	106.50	104.50	106.82	91.18	100.03	95.95	96.82	94.89	84.37	82.55	66.32	38.39
2019_GE	50	27.08	15.96	8.08	4.16	2.36	2.22	5.52	12.98	20.54	46.84	67.04	96.20	93.68	102.12	88.80	73.80	68.38	61.32	60.06	60.76	52.40	53.76	63.62	53.72
2019_U	173	20.35	11.11	5.75	4.80	3.39	3.42	3.48	6.87	17.32	47.02	76.31	78.11	92.01	93.75	90.38	75.37	65.91	55.34	43.45	42.27	49.06	47.86	45.75	36.59

Table 2 Number of IPS in particular interval throughout the semester by all groups



	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
2019_U	20.35	11.11	5.75	4.80	3.39	3.42	3.48	6.87	17.32	47.02	76.31	78.11	92.01	93.75	90.38	75.37	65.91	55.34	43.45	42.27	49.06	47.86	45.75	36.59
2019_GE	27.08	15.96	8.08	4.16	2.36	2.22	5.52	12.98	20.54	46.84	67.04	96.20	93.68	102.12	88.80	73.80	68.38	61.32	60.06	60.76	52.40	53.76	63.62	53.72
2019_DE	18.34	9.71	8.05	2.26	2.24	7.66	13.03	9.18	19.82	36.24	67.24	85.53	106.50	104.50	106.82	91.18	100.03	95.95	96.82	94.89	84.37	82.55	66.32	38.39
2018_DE	33.36	17.73	15.09	4.18	0.27	0.73	0.73	2.45	5.18	10.73	23.73	65.09	98.18	110.36	132.27	131.00	160.91	174.45	112.64	115.55	113.09	109.27	127.18	100.82
2018_F2F	40.44	30.12	13.18	7.00	3.69	1.33	2.91	7.34	26.18	81.91	114.47	121.35	129.08	109.49	154.81	141.83	96.77	78.45	74.39	70.97	83.92	75.66	83.09	62.86
Total number of interactions	139.58	84.63	50.15	22.41	11.95	15.35	25.66	38.83	89.04	222.74	348.79	446.28	519.45	520.22	573.08	513.18	491.99	465.51	387.35	384.44	382.84	369.11	385.95	292.38

Figure 9.3 1 Graphical representation of number of IPS in particular interval throughout the semester by all groups

Figure 9.3.1 shows interactions made by 2018_DE students which showed lowest interactions between 1am and 10am whereas highest interactions were made at 5pm per student.

2019_DE students made lowest interactions between 12am and 8am A nearly constant pattern was seen between 12pm to 2pm and 4pm to 7pm. The highest number of interactions were seen at 12pm and 2pm.

2019_GE students showed lowest interactions between 12am and 8am. The highest interactions were made at 1pm that decreased every hour till 8 pm.

2019_U students made highest interactions(93.75 per student) at 1pm and lowest interactions (3.39 per student) at 4am.

From all of the five groups, 2018_DE students showed highest and lowest IPS at 5p.m. and 4 a.m. that were 174.45 and 0.27, respectively.

Also, the most active time was 2pm. Moreover, from table 2, the total highest number of interactions were made 2019_U at 1pm that were 16218 interactions by 173 students.

9.3.2 Interactions with tutorial file

The highest IPS for Tutorial 01 were made by 2018_DE students that were 0.45 IPS at 4pm followed by 2018_F2F students, noted 0.33 IPS at 9am.

For Tutorial 02, 0.55 IPS were the highest made by 2018_DE students at 5pm followed by 2019_GE which were 0.32 at 11am.

Moving towards Tutorial 03, 0.73 IPS were made by 2018_DE at 5pm and 10pm which were the highest interactions followed by 2018_F2F that were 0.56 IPS at 9am. After this, 2019_U made third highest interactions for Tutorial 03 that were 0.27 at 10am whereas both 2019_DE and 2019_GE students made 0.34 IPS at 5pm and 11am respectively.

In Tutorial 04 and Tutorial 05, the highest interactions were made by 2018_DE that were 0.55 IPS at 4pm and 12pm respectively. 2018_F2F followed Tutorial 04 with 0.38 IPS at 9am and 2019_DE by 0.34 IPS at 6pm.

After 2018_DE, 2018_F2F students made 0.29 IPS with Tutorial 05 at 11am followed by 2019_GE with 0.26 IPS at 11am.

Again, 2018_DE students showed highest number of interactions with Tutorial 06 that were 0.45 at 9pm followed by 2019_DE with 0.24 IPS at 1pm.

The lowest number of IPS were seen for all the five groups at mid-night.

2018_DE group showed highest number of interactions with all tutorial files from 11pm to 10pm. Moreover, 2018_F2F students interacted at 9am and 11am whereas 2018_DE students interacted at 5pm the most. 2019_U group interacted between 10am

and 3pm, 2019_DE interacted at 4pm and 6pm as 2019_GE interacted at 11am and 1pm the most.

All in all, 0.73 IPS were highest made with Tutorial 03 by 2018_DE at 5pm and 10 pm which were actually 8 interactions in total by 11 students but the most active time to interact with tutorial files was 5pm by 2018_DE whereas lowest interactions were made between 12am to 7am. .

Additionally, it can be seen from table 6 highest number of interactions were 380 made by 2018_F2F with Tutorial 03 by 100 students. Also, the tutorial files were interacted highly at 9am, 10am, 11am, 4pm, 5pm and 6pm. The lowest interactions were observed from 7pm till 8am for all group.

9.3.3 Interactions with course material by means of videos (SCORM package)

9.3.3.1 Interactions with theoretical course material's videos

For FLO Overview, 2018_DE students made highest interactions, 1.73 IPS at 5pm followed by 2018_F2F that were 0.76 IPS at 6pm. 0.68 IPS were made by 2019_GE at 5pm. On the other hand, 2019_DE made 0.50 IPS at 12pm and 8pm.

Moving towards Conceptual Modelling, 0.91 IPS were made by 2018_DE at 12pm followed by 2019_GE with 0.52 at 7pm. 2018_F2F and 2019_DE made 0.38 and 0.39 IPS at 1pm and 11am respectively.

Database Architecture and Web were interacted 1.45 times at 4pm by 2018_DE which was the highest figure noted followed by 2018_F2F with 0.41 IPS at 2pm. 2019_DE showed 0.39 interactions at 11am whereas 2019_GE showed 0.34 IPS at 12pm and 5pm. Fifth highest interactions were shown by 2019_U that were 0.24 IPS at 11am.

For Database Environment, the highest number of interactions were 1.73 by 2018_DE at 1pm followed by 2018_F2F that were 0.59 IPS at same time (1pm). After these two groups, 2019_GE and 2019_DE showed 0.58 and 0.53 IPS at 9pm and 10pm respectively. 2019_U followed these groups by 0.30 IPS at 2pm.

In software development lifecycle, 2018_DE and 2018_F2F students made highest interactions that were 1.36 and 0.7 IPS at 12pm and 1pm respectively. 2019_DE students showed 0.55 whereas 2019_GE showed 0.28 IPS. For software development lifecycle, lowest interactions were shown by 2019_U that were 0.25 per student.

For Enhanced ER Modelling, 2018_DE showed one interaction per student were highest at 12pm. 2019_DE followed 2018_DE with 0.68 IPS at 1pm. 2018_F2F made 0.45 IPS at 12pm whereas 2019_GE made 0.4 IPS at 5pm. 0.34 interactions were made by 2019_U at 10am noted as fifth highest interactions made for Enhanced ER Modelling per student.

For ER Modelling part I, 1.45 IPS were highest made by 2018_DE at 2 pm. 2019_DE followed 2018_DE with 0.66 IPS at 4pm whereas 2018_F2F made 0.5 interactions at

1pm per student. 2019_GE and 2019_U made 0.46 and 0.36 IPS at 1pm and 11am respectively.

2018_DE students made 1.27 IPS with ER Modelling part II at 4pm followed by 2019_DE, 0.63 at 3pm. 2018_F2F made 0.4 IPS at 8pm as 2019_GE made 0.28 at 6pm. 2019_U showed 0.20 IPS at 1pm.

For HowToUnilife, the highest interactions were 1.45 made by 2018_DE at 5pm followed by 2018_F2F, 0.47 at 3pm. 2019_DE and 2019_GE made 0.29 and 0.24 IPS at 12pm and 3pm respectively. Only 0.10 interactions were made by 2019_U at 10am and 7pm per student.

In Logical Modelling , 2018_DE showed highest interactions which was 1 interaction per student at 12pm followed by 2019_GE that were 0.58 IPS at 10am. 2019_DE showed third highest and 2018_F2F showed fourth highest IPS, noted 0.55 and 0.52 at 4pm and 2pm respectively followed by 2019_U with 0.27 IPS at 2pm.

Logical Modelling II showed highest number of interactions by 2018_DE that were 2 IPS at 12pm followed by 2019_DE, 0.63 IPS at 12pm as well. 0.5 and 0.32 IPS were shown by 2018_F2F and 2019_GE at 12pm and 10am respectively. 0.27 interactions were shown by 2019_U students at 1pm.

Normalization I showed highest interactions at 12pm and 8 pm which were 0.73 IPS by 2018_DE. 2019_GE followed it with 0.66 interactions at 11am per student. 2018_F2F made 0.61 interactions, the third highest at 2pm. 2019_DE and 2019_U made 0.47 and 0.34 IPS at 2pm and 11am.

Normalization II had 0.73 as highest number of interactions by 2018_DE at 8pm. 2018_F2F, 2019_GE and 2019_DE showed 0.43, 0.36 and 0.34 IPS at 12pm,12pm and 3pm respectively followed by 2019_U with 0.18 IPS at 5pm.

The highest number of interactions for Topic Introduction were 3.09 made by 2018_DE at 6pm. 2018_F2F followed it with 1.18 interactions at 2pm. 2019_DE, 2019_GE and 2019_U made 0.53, 0.44 and 0.19 at 2pm, 1pm and 3pm respectively.

The last three topics (Relational Algebra part 01, Relational Algebra part 02 and the relational model) were not included for 2018 data, so they are compared with 2019 groups only.

For Relational Algebra part 01, 2019_DE and 2019_GE showed similar interactions, 0.34 at different timings, 12pm and 5pm respectively whereas 2019_U followed them by 0.28 IPS at 11am.

For Relational Algebra part 02, 0.47 were the highest number of interactions made by 2019_DE at 12pm and 1pm followed by 2019_GE with 0.34 IPS at 4pm. 2019_U again showed lowest interactions from 3 groups that were 0.17 at 9pm.

2019_DE showed 0.58 IPS for Relational Model at 8pm. 2019_GE and 2019_U showed 0.3 and 0.36 IPS at 10am (both).

Lastly, 2018_F2F made most of the interactions between 11am to 4pm and at 8pm as 2018_DE made highest interactions at 12pm and 1pm, and from 4pm to 9pm. 2019_DE had highest interactions between 11am to 9pm, 2019_GE from 12pm to 5pm and at 7pm and 9pm. 2019_U interacted mostly between 10am and 4pm. Additionally, all five groups made lowest interactions (zero) at mid night.

The highest number of IPS were 3.09 shown by 2018_DE at 6pm with Topic Introduction that were actually 34 interactions by 11 students, but the most active time was 12pm by same group. Moreover, it can be seen from table 7 that highest interactions were 1164 made by 2018_F2F with Topic Introduction by 100 students. The most active time for interactions with theoretical course materials' videos was 8am to 12am (midnight) for all groups whereas material was interacted lowest otherwise.

9.3.3.2 Interactions with practical course material's videos

For SQL Introduction, 2018_DE students made highest interactions that were 1.73 IPS at 7pm. The second highest interactions were made by 2018_F2F students that were 0.68 at 12pm followed by 2019_DE. 0.61 at 12pm and 6pm. 2019_GE and 2019_U students made fourth and fifth highest interactions, 0.46 and 0.23 at 1pm and 5pm.

For SQL P2 aggregates, 2018_DE made one interaction per student at 10pm that were noted the highest interactions followed 0.5 IPS by 2018_F2F at 2pm. 2019_DE students followed these two groups with 0.42 IPS at 4pm. 2019_GE and 2019_U students made fourth and fifth highest interactions that were 0.3 and 0.16 at 2pm and 6pm respectively.

Further SQL P2: WHERE, 2018_DE and 2018_F2F made highest and second highest interactions that were 1.55 and 0.68 at 4pm and, 4pm and 10am. 2019_GE, 2019_DE and 2019_U followed other two groups in descending order, noted 0.54, 0.34 and 0.27 at 12pm, 12pm and 6pm, and 10am respectively.

For SQL P3: Order by and group by, 0.82 were the highest number of interactions made by 2018_DE at 6pm while 2018_F2F made 0.65 interactions pe student at 12pm. 2019_DE made 0.55 IPS at 12pm and 6pm. 2019_GE made 0.4 IPS at 11am followed by 2019_U with 0.21 IPS at 1pm.

For SQL P4: correlated subqueries, 2018_DE made highest interactions, 0.73 at 7pm and 10pm. 2019_DE followed 2018_DE with 0.55 IPS at 12pm. 2018_F2F and 2019_GE made 0.46 and 0.44 interactions at 8pm and 7pm respectively. 2019_U made 0.20 IPS at 1pm were the fifth highest interactions made.

SQL P4: subqueries were interacted 0.91 times by 2018_DE students at 6pm as 2019_DE made second highest interactions that were 0.76 IPS at 1pm. 2018_F2F made

0.59 were third highest interactions made with SQL P4: subqueries at 5pm per student. 2019_GE and 2019_U made 0.38 and 0.23 IPS at 3pm and 1pm respectively.

For SQL P5: sets, 0.82 interactions were made by 2018_DE at 12pm whereas 0.55 interactions were made by 2018_F2F at 2pm per student. 0.32 interactions were made by 2019_DE at 11am, 12pm, 2pm and 6pm. Also 0.32 interactions were made by 2019_GE at 8pm per student. 2019_U students made 0.26 IPS at 2pm were the fifth highest.

For SQL P6: multi-table joins, 1.27 interactions were the highest made by 2018_DE students at 9pm. 2018_F2F and 2019_DE made similar interactions, 0.42 at same time, 11am followed by 2019_GE, 0.26 at 5pm as 2019_U students made 0.14 IPS at 2pm and 5pm.

For SQL P7: create and alter table, highest interactions were shown by 2018_DE, 0.73 at 3pm while 2019_DE showed second highest interactions, 0.34 at 9pm. 2018_F2F showed 0.31 interactions at 2pm as 2019_GE students showed 0.24 at 8pm per student. 2019_U students showed 0.14 IPS at 4pm.

For SQL P7: insert, update, delete; 1.09 interactions were the highest made by 2018_DE at 2pm. 0.66 were the second highest interactions made by 2019_DE at 3pm followed by 2091_GE with 0.44 interaction per student at 3pm. 2018_F2F and 2019_U made 0.41 and 0.15 IPS at 1pm and 11am.

For SQL P7: views, 0.73 interactions were the highest made by 2018_DE at 4pm followed by 2018_F2F and 2019_DE which were 0.29 for both at 9pm and, 6pm and 7pm. 0.18 interactions were made by 2019_U at 4pm.

SQL P8: Integrity Enhancement Features showed 0.55 interaction per student at 12pm by 2018_DE were the highest interactions. 2019_DE made second highest interactions, 0.37 at 2pm. 2018_F2F students made 0.26 interactions at 8pm followed by 2019_GE with 0.18 at 1pm. 2019_U made 0.12 IPS at 2pm.

For SQL P8: transactions and access control, 2018_DE showed 0.73 IPS at 6pm and 7pm were highest. 2018_F2F followed it with 0.4 IPS at 10pm whereas 2019_GE made 0.3 IPS. 2019_DE and 2019_U showed 0.29 and 0.13 interactions at 1pm and 4pm respectively.

All in all, 2018_F2F showed most interactions between 10am and 10pm whereas 2018_DE interacted between 11am to 10pm the most. 2019_DE students interacted between 10 am to 10pm and 2019_GE interacted between 11am to 9pm the most. 2019_U made most of the interactions between 9am to 11pm.

Additionally, the highest number of IPS were 1.73 by 2018_DE at 7pm with SQL Introduction which were actually 19 interactions in total by 11 students, but the most active time was 4pm by 2018_DE. Also, from table 8, the highest number of interactions were 696 by 2018_F2F with SQL P2: WHERE. Also, the interactions

were made between 7am to 12am(midnight) and some groups interacted from 10am the most.

9.3.4 Interactions with reflection quizzes per student

The reflection quiz for background to databases were interacted 9.73 times by 2018_DE at 5pm followed by 2018_F2F and 2019_GE with 5.95 and 5.44 at 12pm and 1pm respectively. 2019_U and 2019_DE made 3.05 and 2.53 IPS at 12pm and 8pm.

The Conceptual DB Design was interacted 5.27 times by 2018_DE at 5pm. 1.95, 1.7 and 1.16 were the second, third and fourth highest interactions made by 2018_F2F, 2019_GE and 2019_DE at 3pm, 3pm and 5pm respectively. 0.87 were the fifth highest interactions made by 2019_U at 9pm.

For Database Software Development Lifecycle, 2018_DE made 5.36 IPS at 11pm which were followed by2018_F2F with 2.45 at 1pm. 2019_DE and 2019_GE showed almost similar interactions at 9pm and 1pm as 2019_U made 0.71 at 11am.

For EER Modelling, 2.09 and 1.46 IPS were made by 2018_DE and 2019_GE at 2am and 6pm. 0.97 and 0.91 interactions were noted for 2019_DE and 2018_F2F at 5pm and 12pm whereas 0.28 IPS were noted for 2019_U at 11am.

For ER Modelling, the highest number of interactions made were 17.64 by 2018_DE at 5pm. 2018_F2F, 2019_GE, 2019_DE and 2019_U showed 4.41, 3.14, 2.42 and 2.38 IPS at 12pm, 9pm, 5pm and 2pm respectively.

The reflection quiz for Logical Modelling was interacted 3.36 times by 2018_DE at 12pm followed by 2019_DE with 2.53 at 8pm. 2.42 and 1.59 interactions were made by 2019_GE and 2018_F2F at 12pm and 10am. 2019_U showed 0.64 IPS at 12pm.

For Normalization, 3.64 and 3.06 were the highest and second highest interactions made by 2018_DE and 2019_GE at 5pm and 10am. 2018_F2F and 2019_DE showed 2.03 and 1.71 IPS at 2pm and 9pm as 2019_U showed 0.67 IPS at 6pm.

For relational algebra, 2018_DE students showed 7.45 IPS at 8pm followed by 2019_DE with 3.45 at 2pm. 2018_F2F, 2019_GE and 2019_U showed 2.92, 1.96 and 1.23 IPS t 11am, 10pm and 2pm respectively.

For SQL intro, 8.73 and 3.81 interactions were showed by 2018_DE and 2018_F2F at 7pm and 2pm. 2.08 IPS were made by 2019_GE at 1pm whereas 2019_DE and 2019_U made 1.92 and 1.02 interactions at 6pm and 5pm.

For SQL P2: Aggregates, 4.27 and 4.07 IPS were made by 2018_DE and 2018_F2F at 3pm and 2pm. 2019_GE showed 1.08 interactions at 12pm. Similar interactions were shown by 2019_DE and 2019_U that were 0.61 at12am and 7pm; and at 3pm respectively.

For SQL P2: WHERE, 9.36 IPS were made by 2018_DE at 10pm. 2018_F2F followed it by 6.59 IPS at 2pm. 2019_GE, 2019_DE and 2019_U made 1.98, 1.47 and 0.82 IPS at 5pm, 2pm and 2pm respectively.

For SQL P3: order by and group by, 2018_F2F students made 7.64 IPS at 7pm followed by 2018_DE with almost similar interactions, 7.36 IPS at 10pm. After this, 2019_GE showed 2.84 at 12pm, 2019_DE showed 2.66 at 2pm and 2019_U showed 0.63 IPS at 4pm and 8pm.

For the relational model, 4.09 IPS made by 2018_DE at 5pm whereas 2019_DE made 2.50 at 4pm. 2018_F2F, 2019_GE and 2019_U made 1.91, 1.62 and 1.49 IPS at 12pm and 2pm; 8pm and 12pm respectively.

2018_F2F students most between 10am and 3pm as 2018_DE interacted most at 5pm, 10pm and 11pm. 2019_DE students interacted most between 12pm to 10pm, 2019_GE interacted most between 10am to 11pm as 2019_U students interacted most at 12pm and 2pm.

Also, the highest number of IPS were 17.64 by 2018_DE with ER Modelling at 5pm which were actually 194 interactions by 11 students whereas most active time was 5pm by 2018_DE but from table 9, highly interacted file was background to databases with 4961 total interactions by 2018_F2F which were 49.61 IPS but actually IPS were highest for 2018_DE with 59.18 (651 interactions by 11 students). The lowest number of interactions were 102 made by 2018_DE with EER Modelling that ended up with 9.27 IPS but lowest IPS were 2.50 by 2019_U that were 433 interactions by 173 students. Moreover, students interacted with reflection quizzes from 7am to 2am(midnight) whereas some groups also showed interactions from 2am to 6am.

9.3.5 Interactions with practical quizzes (checkpoints)

For checkpoint 1, 2018_DE students made highest interactions, 7.55 per student at 9pm followed by 2018_F2F with 4.34 IPS at 11am. On the other hand, 2019_DE, 2019_U and 2019_GE students showed 2.45, 2.36 and 2.28 IPS at 9pm, 2pm and 2pm respectively.

For checkpoint 2, 2018_F2F students showed highest interactions that were 5.38 at 2pm followed by 2019_U with 3.08 at 11am. 2019_DE, 2019_GE and 2018_DE showed 2.79, 2.64 and 2.45 IPS at 6pm, 2pm and 7pm respectively.

For checkpoint 3, 2018_F2F showed 4.55 IPS at 3pm followed by 3.55 by 2019_DE at 8pm. 2018_DE, 2019_U and 2019_GE showed 3.45, 3.06 and 1.84 IPS at 11pm, 11am and 2am.

For checkpoint 4, 2018_F2F, 2019_DE and 2018_DE showed 4.81, 4.29 and 4.18 IPS at 3pm, 12pm and 5pm whereas 2019_U and 2019_GE showed 3.43 and 2.72 IPS at 3pm and 11pm respectively.

For checkpoint 5, 2018_DE students interacted 7.18 times at 5pm. 2019_U, 2018_F2F and 2019_DE showed 3.39, 3.18 and 3.03 IPS at 4pm, 3pm and 1 pm as 2019_GE showed 2.06 IPS at 2pm.

For checkpoint 6, highest interactions were made by 2018_DE that were 5 IPS at 3pm. 2018_F2F followed it by 3.57 at 3pm and 3.26 by 2019_DE at 7pm. 2019_U and 2019_GE showed 2.58 and 1.86 IPS at 10am and 1pm respectively.

For checkpoint 7, 4.27 were the highest interactions made by 2018_DE at 4pm followed by 2019_DE with 3.92 IPS at 12pm. 2018_F2F and 2019_U students showed third and fourth highest IPS that were 2.76 and 2.38 at 10am and 1pm. 2019_GE showed 1.98 IPS were the fifth highest at 11pm.

For checkpoint 8, 3.97 IPS were made by 2019_DE students at 3pm followed by 2018_DE and 2018_F2F with 3.36 and 3.26 at 1pm and 3pm respectively. 2019_GE and 2019_U showed almost similar interactions, 2.94 and 2.92 at 12pm.

For checkpoint 9, 7.72 IPS were made by 2018_DE at 2pm whereas 2019_DE followed it by less than half of interactions made by 2018_DE, 3.13 at 9pm. 2019_U, 2019_GE and 2018_F2F made 2.55, 2.38 and 2.36 IPS at 3pm, 2pm and; at 3pm and 10pm respectively.

For checkpoint 10, 13.09 IPS were made by 2018_DE at 5pm whereas 2018_F2F and 2019_DE showed nearly one fourth interactions of 2018_DE that were 3.56 and 3.26 at 12pm and 9pm respectively. 2019_U and 2091_GE showed 2.21 and 1.8 IPS at 12pm and 7pm.

For checkpoint 11, 2018_DE showed 10.73 IPS at 5pm. Almost one fifth of 2018_DE interactions were made by 2019_DE and 2018_F2F, 2.68 and 2.31 at 7pm and 3pm. 2019_U and 2019_GE showed fourth and fifth highest interactions noted 1.89 and 1.54 at 2pm and 1pm respectively.

For checkpoint 12, 2019_DE highest interactions, 4.58 at 9m followed by 2018_DE with 3.64 IPS at 11am. 2018_F2F and 2019_U showed 2.66 and 2.47 IPS at 4pm and 12pm. 2019_GE showed fifth highest interactions, 1.64 per student at 3pm.

For checkpoint 13, 5.82 IPS were made by 2018_DE at 1pm followed by 2018_F2F with 2.83 at 4pm. 2019_U, 2019_DE and 2019_GE made 1.75, 1.61 and 1.26 at 5pm, 10pm and 7pm.

For checkpoint 14, 2018_DE and 2019_DE made 3.91 and 3.11 IPS at 5pm and 1pm whereas 2019_GE showed 2.72 IPS at 10pm. On the other hand, 2019_U and 2018_F2F showed 1.86 and 1.51 IPS both at 8pm.

For the last checkpoint 15, 2018_DE made 1 interaction per student at 7pm followed by 2019_GE with 0.94 at 9pm. The third highest interactions were made by 2018_F2F , 0.82 at 11pm. 2019_DE and 2019_U showed 0.58 and 0.47 IPS.

2018_F2F interacted most between 10am and 3pm whereas 2018_DE at 4pm and 5pm. 2019_DE were most active between 11am to 9pm, 2019_GE were most active between 10am to 11pm and 2019_U showed most active time from 10am to 5pm.

Overall, the highest IPS were 13.09 by 2018_DE with Checkpoint 10 at 5pm which were actually 144 interactions by 11 students. Also, the most active time was 5pm by same.

Additionally, according to table 10, the highest interactions were 5264 with checkpoint 4 by 2019_U that were 30.43 IPS but highest IPS were 48.73 made with checkpoint 10 by 2018_DE which were in fact 536 interactions. The lowest interactions shown were 37 interactions with checkpoint 15 which were indeed lowest IPS as well giving figure of 3.36. Also, 2018_DE students did not show any interaction between 2am and 8am but negligible at 9am and 10am whereas highly interactions were made between 8am and 2am.

9.3.6 Interactions with external tools per student

For assignment extension requests, 2018_DE students made 0.64 IPS at 4pm followed by 2019_DE with 0.13 at 6pm. 2019_GE made 0.1 at 1pm whereas 2019_U and 2018_F2F made 0.07 and 0.06 IPS at 12pm and 9am respectively.

For online structured Oral Examination portal, 1.64 were the highest interactions made by 2018_DE at 1pm followed by 2019_DE with 0.45 at 1pm. 2019_GE interacted 0.1 times at 4pm whereas 0.03 interactions were made by 2019_U at 8am. Nil interactions were made by 2018_F2F with online structured Oral Examination portal.

For SAM (statement of assessment methods), 1.45 IPS were made by 2018_DE at 3pm. 2019_U, 2019_GE and 2018_F2F made 0.69, 0.64 and 0.6 IPS were made at 2pm, 12pm and 10am respectively.

All other four groups (2018_DE, 2019_DE, 2019_GE, 2019_U) made nil interactions at mid night.

Moreover, 2018_F2F interacted mostly at 10am and 2018_DE at 1pm. On the other hand, 2019_DE interacted most between 11am and 10pm whereas 2019_GE at 12pm and 2pm. Lastly, 2019_U interact most between 12pm and 2pm.

The highest number of IPS were 1.64 by 2018_DE at 1pm with online structured Oral Examination portal which were actually 18 interactions by 11 students in total, but the most active time was 1pm by 2018_DE.

Moving further, from table 11, highest IPS were 10.82 by 2018_DE with SAM that were 119 interactions, but total highest interactions were 899 (5.20 IPS) by 2019_U with SAM. The lowest interactions and IPS made were 14 interactions and 0.14 IPS with assignment extension by 2018_F2F. All the groups made interactions with external tools between 9am to 1am(midnight) except 2018_F2F that did not interact with Online Structured Oral Examination Portal.

9.3.7 Interactions with F2F notes

For F2F 01a, 0.45 were the highest interactions made by 2018_DE students at 7pm followed by 2018_F2F, 0.2 IPS at 3pm. 2019_GE, 2019_DE and 2019_U made 0.16, 0.13 and 0.10 IPS at 7pm, 8pm and 12pm.

For F2F 01b, 2018_DE students made 0.36 at 1pm and 4pm as 2018_F2F made 0.2 IPS at 10am. 2019_DE students made 0.11 IPS at 8pm followed by 2019_GE with 0.1 IPS at 8pm and 9pm. 2019_U made 0.06 IPS at 11am which were fifth highest interactions made for F2F 01b.

For F2F 02a, 0.55 interactions were made at 2pm by 2018_DE whereas 2018_F2F made 0.17 inte4rcations per student at 12pm. 2019_DE made 0.08 and 2019_GE made 0.06 IPS at 9am and 7pm and 8pm and 9pm respectively. 2019_U students showed 0.03 IPS at 1pm.

F2F 02notes were interacted 0.27times by 2018_DE at 12pm, 1pm and 8pm. 2018_F2F made 0.13 IPS at 12pm followed by 2019_DE with 0.05 IPS at 4pm and 10pm. 2019_GE students made 0.04 interactions at 10am, 1pm, 4pm and 5pm per student. Only 0.03 IPS were noted for 2019_U, the fifth highest interactions made at 2pm.

F2F 03 and F2F 03notes were not included in 20218 data, for this only 2019 data is compared.

For F2F 03, 2019_GE showed 0.1 interaction per student followed by 2019_U with 0.07 at 1pm and 2pm; and 2019_DE students made 0.05 IPS at 9pm.

For F2F 03 notes, 0.06 interactions were made by 2019_GE at 1pm followed by 2019_DE with 0.03 at 5am, 1pm, 3pm, 4pm, 5pm, 7pm ,8pm and 9pm. 2019_U students showed 0.02 IPS at 2pm.

For F2F 04, 0.64 interactions were made by 2018_DE at 2pm followed by 2018_F2F with 0.19 IPS at 12pm. 2019_DE, 2019_GE and 2019_U students made 0.11, 0.12 and 0.13 IPS at 7pm, 1pm and 2pm respectively.

For F2F 04notes, 0.36 interactions were made at 2pm and 3pm by 2018_DE as 2018_F2F followed it with 0.19 at 12pm. Also, 2019_GE showed 0.18 interactions at 1pm and 2019_DE showed 0.05 interactions at 1pm, 5pm, 6pm and 7pm per student. 0.03 interactions were noted for 2019_U students at 8pm.

F2F 06 notes were interacted 0.27 times by 2018_DE at 1am and 6pm as 2018_F2F interacted 0.11 times at 3pm. 0.11 interactions were made by 2019_DE at 2pm and 7pm whereas 0.08 IPS were made by 2019_GE at 10pm. 2019_U students showed 0.03 IPS at 8pm and 9pm.

For F2F 06notes, 0.27 interactions were made at 1am and 9pm by 2018_DE students followed by 2018_F2F with 0.11 IPS at 3pm and 4pm. 2019_GE students made 0.08

and 2019_DE students made 0.05 at 4pm; and at 12pm and 4pm. 0.02 interactions were shown by 2019_U at 1pm.

For F2F 07, 2018_De students showed 0.73 IPS at 9pm followed by 2018_F2F with 0.3 IPS at 6pm. 2019_Ge made 0.12 interactions at 8 am whereas 2019_DE made 0.08 IPS at 2pm, 3pm, 4pm and 7pm. 2019_U showed fifth highest interactions made with F2F 07 that were 0.06 at 2pm.

For F2F 09 notes, 0.27 IPS were made at 2pm, 4pm, 5pm and 6pm followed by 2018_F2F with 0.09 IPS at 3pm. 2019_GE, 2019_DE and 2019_U made 0.08 at 1pm and 4pm; 0.05 at 1pm and 3pm; and 0.03 at 2pm.

For F2F 10a notes, 0.27 were the highest interactions made by 2018_DE at 5pm and 7pm. 2019_GE followed it with 0.18 at 1pm whereas 2019_DE made 0.16 at 7pm. 2019_U students made 0.07 IPS at 2pm.

F2F 11 and F2F 11notes were not included in 2019, only data for 2018 is compared.

For F2F 11, 2018_DE students made 0.64 IPS at 2pm followed with 0.21 IPS at 4pm by 2018_F2F.

For F2F 11notes, 0.55 interactions were made by 2018_De at 4pm whereas 0.13 interactions were made by 2018_F2F at 11am.

2018_F2F made most interactions between 9am to 11 pm and at 12am. 2018_DE students interacted most at 12pm, 2pm, 4pm and 9pm. 2019_DE students made most of the interactions at 7pm as 2019_GE students interacted at 1pm the most. 2pm was the most active time for 2019_U students.

Overall, the highest number of IPS were 0.73 by 2018_DE at 9pm with F2F 07 that were 8 interactions in total by 11 students. Moreover, the most active time was 2pm by 2018_DE.

Further, from table 12, the highest interactions made were 198 (1.98 IPS) with F2F 01 by 2018_F2F students but highest IPS were 2.73 (30 interactions) by 2018_DE with F2F 01 and F2F 07. Also, lowest interactions made were 6 (0.55 IPS) by 2018_DE with F2F 10a notes but lowest IPS were 0.11 (19 interactions) by 2019_U with F2F 09 notes.

9.3.8 Interactions with chapter (PDFs)

9.3.8.1 Interactions with theoretical course material's chapter PDFs

In Case study: University Accommodation Specification, 0.73 interactions were made by 2018_DE at 5pm followed by 2018_F2F with 0.34 at 10am. 2019_GE showed 0.3 at 11 and 2019_DE showed 0.29 IPS at 12pm. 0.21 interactions were noted for 2019_U students at 2pm.

For Conceptual DB Design, 0.36 interactions were made by 2018_DE at 2pm and 4pm. After this, 0.24 interactions were made by 2019_GE at 1pm as 2019_DE made 0.21

IPS at 4pm. 2018_F2F interacted 0.2 times at 1 pm followed by 2019_U with 0.14 IPS at 1pm as well.

For Database Architecture and Web, 0.34 were the highest number of interactions made by 2019_Ge at 12pm followed by 2018_De with 0.27 at 8pm. 2019_DE and 2019_U showed similar interaction that were 0.16 at 8pm and 10pm; and at 10am. 0.12 were the fifth highest interactions made by 2018_F2F at 12pm.

For Database Environment, 2018_DE interacted 0.45 times at 5pm as 2019_GE followed it by 0.3 at 12pm. 0.18 IPS were shown by 2019_DE students at 10am and 10pm, the third highest interactions. 2019_U students made 0.16 interactions at 12pm as 2018_F2F made 0.12 IPS at 1pm.

For Database Software Development Lifecycle, 0.82 IPS were made by 2018_DE students at 2pm whereas 2018_F2F made 0.35 at 12pm were second highest interactions made for Database Software Development Lifecycle. 2019_GE, 2019_DE and 2019_U made 0.3, 0.24 and 0.14 IPS at 1pm, 4pm and 1pm respectively.

For EER Modelling, 2018_DE interacted 0.91 times at 12pm whereas 2018_F2F interacted 0.37 times also at 12pm. 2019_GE students made third highest interactions with 0.24 at 4pm per student. 2019_U and 2019_DE showed 0.14 and 0.13 IPS at 11am and 1pm; and 12pm, 3pm and 4pm.

For ER Modelling, 0.64 interactions were made by 2018_DE students at 8pm. 2019_GE showed second highest interactions, 0.42 at 1pm. 2018_F2F made 0.38 IPS at 1am followed by 2019_DE with 0.24 at 4pm. 2019_U students made 0.21 IPS at 1pm.

For Introduction to Database, 0.48 were the highest interactions made by 2019_GE at 1pm followed by 2018_DE with 0.36 at 12pm, 5pm and 8pm. Further, 0.26 interactions were shown by 2019_DE at 8pm as 0.22 interactions were shown by 2018_F2F and 2019_U at 11am and 1pm.

For Logical Modelling II, 0.45 interactions were shown by 2018_DE at 12pm and nearly close interactions were shown by 2019_GE that were 0.44 IPS at 11am. 2018_F2F students showed third highest interactions, 0.31 at 11am, 1pm and 8pm followed by 2019_DE with 0.29 IPS at 7pm whereas 2019-U showed 0.25 IPS at 1pm were the fifth highest interactions made.

For Normalization, 12pm was the most active time at which students interacted with 0.64 IPS 2018_DE. 2018_F2F followed it by 0.35 IPS at 3pm. 2019_GE showed 0.24 interactions at 1pm as 2019_De and 2019_U showed similar number of interactions. 0.12 at 2pm, 4pm and 7pm; and at 1 pm respectively.

For relational algebra, 0.64 interactions were seen for 2018_DE at 7pm and 8pm. After this, 2018_F2F showed second highest interactions that were 0.3 per student at 10am. 2019_GE, 2019_DE and 2019_U showed 0.26, 0.21 and 0.17 IPS ta 1pm, 4pm and 0.17.

For the relational model, data for 2018 was only included as compared for 2018_F2F and 2018_DE only.

For the relational model, 2018_DE made 0.64 IPS at 7pm whereas 2018_F2F made almost half interactions made by 2018_DE that were 0.34 at 11am.

At last, 2018_F2F made most of the interactions between 9am and 4pm and at 8pm as 2018_DE made most interactions at 12pm, 2pm, 5pm, 7pm, 8pm and at 9pm. 2019_DE students interacted most at 10am, 11am, 12pm and between 2pm to 10pm. 2019_GE students interacted most between 10am to 2pm whereas 2019_U interacted most between 9am to 3pm.

Finally, the highest IPS were 0.91 made by 2018_DE at 12pm with EER Modelling that were 10 interactions by 11 students actually. The most active time was 5pm by 2018_DE.

Also, by table 13, 345 (3.45 IPS) was the highest number if interactions made with Logical Modelling II by 2018_F2F but highest IPS were 4.27 (47 interactions in total) with ER Modelling part II by 2018_DE. On the other hand, lowest interactions were made with Database Architecture and Web, that were 14 (1.27 IPS) interactions by 2018_DE as lowest IPS were 0.84 (147 interactions) made with Database Software Development Lifecycle by 2019_U. All the groups interacted from 8am till 12am (midnight).

9.3.8.2 Interactions with practical chapter PDFs

For SQL Introduction, 0.45 IPS were made by 2018_DE at 7pm followed by 0.29 by 2019_DE at 9pm. After this, 2019_GE, 2018_F2F and 2019_U made 0.26, 0.21 and 0.18 IPS at 11am, 12pm and 10am.

For SQL P2: Aggregates, 0.55 interactions were made by 2018_DE at 10 were the highest interactions. The second highest interactions were 0.44 were made by 2018_F2F at 2pm. 2019_DE, 2019_U and 2019_GE followed it by 0.21 at 12pm, 1pm, 6pm; 0.17 at 10am, 1pm and 0.12 at 1pm, 2pm and 7pm.

For SQL P2: WHERE, 0.64, 0.49, 0.26, 0.24 and 0.21 interceptions per student were made by 2018_DE, 2018_F2F, 2019_GE, 2019_DE and 2019_U at 9pm, 2pm, 2pm, 6pm and 10am respectively.

For SQL P3:order by and group by, 2018_DE and 2018_F2F showed highest and second highest IPS with 0.55 and 0.37 at 4pm and 2pm respectively. On the other hand, 2019_DE, 2019_GE and 2019_U students made 0.21, 0.18 and 0.16 IPS at 1pm; 2pm and 9pm; and 10am which were third, fourth and fifth highest interactions made.

For SQL P4: subqueries and correlated, 2018_F2F made highest interactions with 0.45 IPS at 2 pm followed by 2018_DE with 0.36 at 4pm, 5pm, 6pm and 7pm. 2019_DE, 2019_U and 2019_GE showed 0.32, 0.22 and 0.14 IPS at 11am; 10am; and at 11am, 2pm and 7pm.

For SQL P5: sets, 0.55 and 0.38 IPS were made by 2018_DE and 2018_F2F at 11pm and 2pm. 2019_DE showed 0.24 IPS at 9pm whereas 2019_GE and 2019_U showed similar interactions that was 0.18 at different times, 11am and 10 am respectively.

For SQL P6: multi-table joins, 2018_DE showed highest IPS that were 0.64 at 9pm. 2018_F2F and 2019_DE followed it by 0.29 interactions at 11am and 4pm respectively. 2019_U and 2019_GE made 0.13 and 0.1 interactions pre student at 10am and 2pm; and at 11am, 2pm and 8pm.

For SQL P7: create and alter table, 0.55, 0.28, 0.11, 0.11 and 0.08 IPS were made by 2018_DE, 2018_F2F, 2019_DE, 2019_U and 2019_GE at 8pm, 4pm, 5pm, 1pm and 7pm respectively.

For SQL P7: insert, update, delete, 2018_DE showed 0.36 IPS 2pm, 7pm and 8pm. 2018_F2F showed 0.33 IPS at 4pm followed by 2019_GE with 0.12 at 7pm. 2019_DE and 2019_U showed similar interactions, 0.11 at 5pm and 10am respectively.

For SQL P7: views, 0.36, 0.2 and 0.11 IPS were made by 2018_DE, 2018_F2F and 2019_DE at 6pm, 7pm and 9pm; 4pm and at 10 pm. 2019_Ge and 2019_u showed 0.08 and 0.07 IPS at 2pm and 10am respectively.

For SQL P8: integrity enhancement features, 2018_DE showed 0.36 IPS at 6pm and 7pm. 2018_F2F followed it by 0.19 at 10am whereas 2019_DE showed 0.11 IPS at 12pm. Both 2019_GE and 2019_U showed 0.08 IPS at 12pm and 1pm respectively.

For SQL P8: transactions and access control, 2018_DE and 2018_F2F showed 0.64 and 0.22 IPS at 6pm and 10am. 2019_DE, 2019_GE and 2019_U showed similar interactions that is 0.08 at 11am, 1pm, 8pm; 2pm, 4pm, 11pm; and 12pm.

2018_F2F students interacted mostly between 9am and 4pm whereas 2018_DE interacted most at 1am and between 6pm and 11pm. 2019_DE interacted mostly between 9am to 10pm, 2019_GE showed most interactions between 11am to 2pm and at 7pm. 2019_U students interacted mostly between 9am to 5pm.

Overall, the highest number of IPS was 0.64 with SQL P2: WHERE, SQL P6: multi-table joins and SQL P8: transactions and access control at 9pm, 9pm and 6pm by 2018_DE where actual number of interactions were 7 by 11 students. The most active time when students interacted most was 7pm and 9pm by 2018_DE.

In addition to this, from table 14, SQL P4: subqueries and correlated was most interacted file with a total of 361 (3.61 IPS) interactions by 2018_F2F(100 students) whereas highest IPS were 3.91 with SQL P2:where by 2018_DE that were 43 interactions by 11 students. The highly active time was from 8am till 1am. Also, the lowest interactions and IPS were 14 and 0.28 with SQL P8: Integrity Enhancement Features by 2019_GE(50 students).

9.3.9 Interactions with assignments

For Data Modelling Assignment Part I: Handin, 2018_DE students made 2 IPS at9pm followed by 2018_F2F with 1.91 IPS at11am. 2019_DE, 2019_GE and 2019_U made 0.61, 0.48 and 0.43 IPS at 11pm, 2pm and 11pm.

For Data Modelling Assignment Part I: Resubmission, almost nil interactions were made by 2019_GE, 2018_F2F and 2019_U that were 0.12, 0.11 and 0.02 at 5pm, 12pm and 12am as 2018_DE and 2019_GE did not interacted at all.

For Part A (Data Modelling Assignment Part II), 2018_DE students made 3.18 IPS at 9pm and 2018_F2F students made 1.35 IPS at 9am. 2019_GE, 2019_DE and 2019_U made 0.90, 0.55 and 0.53 IPS at 11pm, 10pm and 11pm respectively.

For Part B (Data Modelling Assignment Part II), 2.91 interactions were made by 2018_DE at 9pm followed by 2018_F2F with 0.93 IPS at 10pm. 0.88, 0.57 and 0.42 IPS were made by 2019_GE, 2019_U and 2019_DE at 11pm, 11pm and 10pm respectively.

Structured Oral Examination was only included for 2018 data, so it is compared between 2018_DE and 2018_F2F. 2018_DE students made 0.18 IPS at 10pm whereas 2018_F2F students made 0.08 IPS at 3pm.

Research Report (GE only) was included in 2019 data for 2019_GE students only where 2019_DE students did not interacted at all but 2019_U students made a few interactions that were 0.03 IPS at 4pm. 2019_GE students made 0.48 IPS at 4pm.

For Supplementary Oral Examination video, 0.6 IPS were made by 2019_GE at 3pm, 6pm and 9pm. 2018_F2F and 2019_U students made 0.19 and 0.05 IPS at 1am and 11pm. 2018_DE and 2019_DE students did not made any interaction.

2018_F2F students were active for 24 hours as 2018_DE interacted most at 9pm. 2019_DE students were most active at 10pm and 11pm; 2019_GE at 11pm and 2019_U students at 10pm and 11pm.

All in all, the highest number of IPS were 3.18 with Part A (Data Modelling Assignment Part II) by 2018_DE at 9pm that were 35 interactions actually by 11 students. The most active time when assignments were interacted was 9pm by 2018_DE.

Also according to table 15, Data Modelling Assignment Part I: Handin was interacted highest, 1613 (16.13 IPS) by 2018_F2F but 16.55 were the highest IPS (182 interactions) by 2018_DE whereas lowest number of IPS were 0.08 (13 interactions) with Data Modelling Assignment Part I- Resubmission by 2019_U and lowest interactions were 9 (0.18 IPS) made with Supplementary Oral Examination video by 2019_GE. Additionally, 2018_F2F interacted 24 hours for assignments, 2018_Des showed interactions from 10am to 11pm. 2019_DEs showed interactions from 9am to 12am. At 1am, there were nil interactions and again came up with a few at 2am. Again, zero interactions noted at 3am till 5am.

9.3.10 Interactions with muddiest points

9.3.10.1Interactions with Muddiest points for theoretical material

For background to databases, 2018_DE students interacted 0.36 times at 4pm and 8pm whereas almost half of 2018_DE's interactions were made by 2018_F2F that were 0.19 at 3pm.

For Conceptual DB Design, 0.18 and 0.06 IPS were made by 2018_DE and 2018_F2F at 2am, 5pm, 9pm and 10 pm; and at 11am, 12am and 9pm.

For Database Software Development Lifecycle, 0.36 and 0.09 IPS were made by 2018_DE and 2018_F2F at 11pm and 8pm.

For EER Modelling, 2018_DE made 0.18 IPS at 2am, 4pm, 5pm and 10pm whereas 2018_F2F made 0.11 IPS at 2pm.

For ER Modelling, 2018_DE and 2018_F2F made 0.36 and 0.1 interaction per student at 5pm and 12pm.

For final SQL quiz, 0.09 IPS were made by 2018_DE at 2pm and 3pm as 2018_F2F students made 0.02 IPS at 3pm and 10pm.

For Logical Modelling , 0.18 and 0.1 interaction per student were made by 2018_DE and 2018_F2F at 6pm and 12pm.

For Normalization, only 2018_F2F interacted 0.06 times at 2pm and 3pm whereas 2018_DE did not interact with it.

For Oral Exam, only 0.02 IPS were shown by 2018_F2F at 4pm and 5pm. Again 2018_DE did not interact with it.

For relational algebra, 0.36 and 0.22 IPS were made by 2018_DE and 2018_F2F at 7am and 9am.

For the relational model, 0.36 and 0.14 IPS were made by 2018_DE and 2018_F2F at 7pm and 11am.

2018_F2F students interacted most between 9am to 4pm and between 6pm to 10pm. 2018_DE students interacted most at 2am and between 4pm to 11pm.

Moreover, the highest IPS was 0.36 by 2018_DE that were actually 4 interactions in total made by 11 students. Additionally, the most active time was 10pm by 2018_DE students.

From table 16, the highest IPS were 2 (22 interactions by 11 students) made with background to databases whereas 2018_F2F made 180 interactions(1.80 IPS) by 100 students with background to databases. The lowest IPS were 0.10 (10 Interactions by 100 students) made with final SQL quiz by 2018_F2F whereas lowest total interactions were 2 (0.18 IPS) made by 2018_DE with final SQL quiz and Logical Modelling .

9.3.10.2Interactions with muddiest point for practical material

For SQL intro, 0.18 and 0.12 IPS were made by 2018_DE and 2018_F2F at 1pm and 2pm. Further for SQL P2: Aggregates, 2018_F2F and 2018_DE made 0.19 and 0.18 IPS at 2pm; and at 3pma and 10pm. The interactions made for SQL P2: WHERE were 0.18 by both 2018_DE and 2018_F2F at 2pm and 10pm; and at 2pm respectively. Moreover, For SQL P3: order by and group for, 2018_DE and 2018_F2F made 0.18 and 0.14 IPS at 4pm and 10pm; and at 2pm.

The SQL P4: subqueries were interacted 0.09 and 0.04 times by 2018_DE and 2018_F2F at 12pm, 7pm and 10pm; and at 11am and 2pm. For SQL P5: sets, 0.09 and 0.03 IPS were made by 2018_DE and 2018_F2F at 3pm; and at 3pm, 8pm and 11pm. 2018_DE and 2018_F2F both showed 0.09 and 0.02 interactions at 6pm for SQL P6: FK and commit. In addition to this, SQL P6: multi-table joins were interacted 0.09 and 0.04 times by 2018_DE and 2018_F2F at 9pm and 10pm; and at 3pm. Lastly, 2018_DE interacted 0.09 times with SQL P6: views, create and update at 6pm as 2018_F2F made 0.01 IPS at 12am, 1am, 2am, 9am, 1pm, 2pm, 5pm, 7pm, 9pm and 10pm. 2018_F2F interacted most at 2pm whereas 2018_DE at 3pm and 10pm.

Additionally, the highest number of IPS were 0.19 at 2pm with SQL P2: Aggregates that were actually 19 interactions by 100 students. The interactions were made highly between 9am to 11pm but the most active time was 10 pm by 2018_DE. According to table 17, highest IPS 0.86 with SQL intro and total highest interactions were also made with SQL intro, 86 interactions by 2018_F2F(100 students). The lowest IPS were 0.06(6 interactions) with SQL P6: FK and COMMIT by 2018_F2F

9.4 Number of interactions by each group according to academic weeks (weekly interactions) in Flinders University

9.4.1 Academic weeks starting and ending dates

For weekly extraction of data, 14 weeks as per the university academic period and 2 weeks for semester break, namely M-S B1(mid-semester break 1) and M-S B2 (mid-semester b2) have been included to get better understanding of the interactions made in the semester. The weeks are named as W1, W2……, W6, M-S B1, M-S B2, W7…., W14 called as week 1, week 2…., week 14. Table below shows the starting and ending date of each week in the year 2018 and 2019.

	2018		2019	
Week number	Start date	End date	Start date	End date
W1	26/02/2018	4/03/2018	4/03/2019	10/03/2019
W2	5/03/2018	11/03/2018	11/03/2019	17/03/2019
W3	12/03/2018	18/03/2018	18/03/2019	24/03/2019
W4	19/03/2018	25/03/2018	25/03/2019	31/03/2019
W5	26/03/2018	1/04/2018	1/04/2019	7/04/2019
W6	2/04/2018	8/04/2018	8/04/2019	14/04/2019
M-S B1	9/04/2018	15/04/2018	15/04/2019	21/04/2019
M-S B2	16/04/2018	22/04/2018	22/04/2019	28/04/2019
W7	23/04/2018	29/04/2018	29/04/2019	5/05/2019
W8	30/04/2018	6/05/2018	6/05/2019	12/05/2019
W9	7/05/2018	13/05/2018	13/05/2019	19/05/2019
W10	14/05/2018	20/05/2018	20/05/2019	26/05/2019
W11	21/05/2018	27/05/2018	27/05/2019	2/06/2019
W12	28/05/2018	3/06/2018	3/06/2019	9/06/2019
W13	4/06/2018	10/06/2018	10/06/2019	16/06/2019
W14	11/06/2018	17/06/2018	17/06/2019	23/06/2019
W15	18/06/2018	24/06/2018	24/06/2019	30/06/2019

Table 3 Starting and ending dates of academic weeks for 2018 and 2019

9.4.2 Interactions throughout the semester per student

Week Number	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
2018_F2F	72.67	94.70	66.41	120.41	131.21	167.65	15.07	12.34	73.67	114.55	96.99	98.37	85.82	110.90	203.61	46.25	45.47
2018_DE	102.45	120.45	126.27	156.09	143.82	97.91	31.00	16.73	57.64	99.27	84.82	85.09	108.64	84.18	145.09	48.36	41.36
2019_DE	55.74	60.87	57.24	73.03	62.97	91.79	29.13	36.05	78.16	74.37	88.82	74.45	118.95	111.58	209.00	48.34	24.87
2019_GE	43.36	45.66	60.10	64.42	104.36	72.02	25.24	45.12	53.52	60.66	53.00	79.00	66.02	73.78	152.72	37.46	44.56
2019_U	42.72	41.75	37.23	56.65	59.48	75.58	16.70	22.15	52.35	70.41	66.86	65.93	70.98	90.36	153.18	28.90	29.61

Table 4 IPS per week throughout the semester

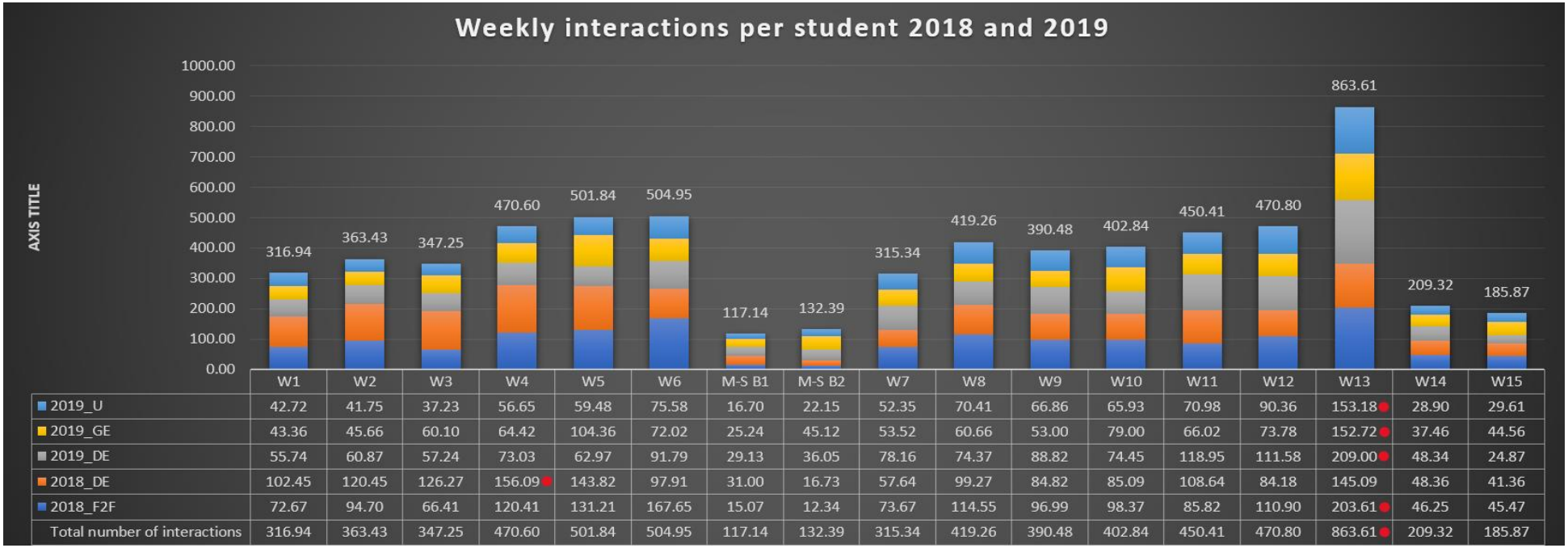


Figure 9.4. 1 Graphical representation of IPS per week throughout the semester

Table 4 shows the number of IPS made in a week with all modules. The total highest number of IPS in a week were made by 2019_DE students that were 209 in W13 followed by 2018_F2F with 203.61 IPS in W13 as well. After this 2018_DE students made 156.09 IPS in W4. 2019_U and 2019_GE students made 153.18 and 152.72 IPS in week 13, respectively. It can also be seen that the lowest interactions were made in mid-semester break and in W14 and W15. All in all, W13 was the highly interacting week with 863.61 interactions by 5 groups (one student from each group) in total.

9.4.3 Interactions with tutorial files (per student)

For Tutorial 01, the highest number of interactions were made by 2018_DE students that were 2 IPS in W2 followed by 2081_F2F with 1.5 IPS in W2 as well. 1.05 and 1.02 interactions were made by 2019_DE and 2019_U in W2 whereas 2019_GE students showed 0.98 which was less than 1 IPS which refers that not all students interacted with Tutorial 01.

For Tutorial 02, 1.73 and 1.10 IPS were noted for 2018_DE and 2019_U in W3. After this, 1.08, 0.94, and 0.76 interactions each student made for 2019_GE, 2018_F2F and 2019_DE in W3.

For Tutorial 03, 2.2 interactions were made weekly per student by 2018_F2F in W4 followed by 2018_DE with 1.64 IPS. 1.04, 1.03 and 0.63 IPS were noted for 2019_GE, 2019_U and 2019_DE in W4, respectively.

For Tutorial 04, 1.81 IPS were noted for 2018_F2F students in W6 followed by 2019_GE and 2018_DE with 0.78 and 0.73 IPS in W6. 2019_DE and 2019_U students showed 0.61 and 0.49 IPS in W5.

For Tutorial 05, 1.16 and 0.73 IPS per week were noticed for 2018_F2F and 2018_DE in W9. 0.56, 0.42 and 0.29 IPS were seen for 2019_GE, 2019_U and 2019_DE in W9.

For Tutorial 06, 1.16 and 0.64 interactions were made by 2018_F2F and 2018_DE in W10 and W13, respectively. 0.44, 0.42 and 0.39 IPS were noted for 2019_GE, 2019_DE and 2019_U in W10.

From all the tutorials, the highest interactions were 2.2 made by 2018_F2F with Tutorial 03 in W4. Clearly, the tutorial files were interacted highly in their respected weeks as shown in the above figures. For example, Tutorial 02- Week 03 was interacted 1.73 times in W3 was the highest number of IPS for it. Otherwise, least or nil interactions were made.

9.4.4 Interactions with course material by means of videos

9.4.4.1 Interactions with theoretical course material

For FLO Overview, 2.86 IPS were made by 2018_F2F in W1 followed by 2019_DE with 2.03 in W1. 1.91, 1.38 and 1.11 IPS were noted for 2018_DE, 2019_GE and 2019_U in W1.

For Conceptual Modelling, 1.27 IPS were made by 2018_DE in W4 and W5 followed by 2019_DE with 1.16 in W4. 2018_F2F, 2019_GE and 2019_U students showed 1, 0.76 and 0.46 IPS in W4, W5 and W4, respectively.

For Database Architecture and Web; 2.18, 1.89, 1.39, 1.15 and 0.8 IPS were noted for 2018_DE, 2018_F2F, 2019_DE, 2019_U and 2019_GE in W3, W2, W1, W1 and W2, respectively.

For Database Environment, 2018_DE and 2018_F2F students showed 2.82 and 2.05 IPS in W3 and W1. 2019_DE, 2019_GE and 2019_U followed them by 2.03, 1.3 and 1.17 IPS in W1, W2 and W1, respectively.

For Database Software Development Lifecycle, 2018_DE students made 2.45 IPS in W3 followed by 2018_F2F with 1.65 in W3. 2019_DE and 2019_U students made 1.34 and 1.06 IPS in W3. 0.76 IPS were noted for 2019_GE in W3 as well.

For Enhanced ER Modelling, 2.05 IPS were made by 2019_DE in W4. 2018_DE and 2018_F2F followed it with 1.55 and 1.31 interactions in W5 and W4 respectively whereas 0.61 and 0.58 IPS were noted for 2019_U and 2019_GE in W4 and M-S B2.

For ER Modelling Part I; 2.27, 1.62, 1.53, 1.16 and 0.76 interactions were noted for 2018_DE, 2018_F2F, 2019_DE, 2019_U and 2019_GE in W4, W3, W3, W4 and W3, respectively.

For ER Modelling part II, 2018_DE students made 2.64 IPS in W4. 2018_F2F followed it by 1.49 IPS in W4 also. 1.11, 0.58 and 0.52 IPS were noted for 2019_DE, 2019_U and 2019_GE in W4, W4 and M-S B2, respectively.

For Explanation of the SAM, 2018_DE students made 3.36 IPS in W1 followed by 2018_F2F with 1.42 IPS in W1.

For HowToUnilife, 2018_F2F, 2018_DE, 2019_GE, 2019_DE and 2019_U students made 2.3, 1.82, 0.56, 0.53 and 0.27 IPS in W1.

For Introduction to Database, 5 IPS were made by 2018_DE in W1 followed by 2018_F2F with 3.39 in same week. 3.05, 1.92 and 1.7 IPS were noted for 2019_DE, 2019_U and 2019_GE in W1.

For Logical Modelling, 1.83 and 1.64 IPS were noted for 2018_F2F and 2018_DE in W6 and W13. 2019_DE, 2019_GE and 2019_U showed 1.21, 0.7 and 0.64 IPS in W13, W14 and W13, respectively.

For Logical Modelling II, 2018_DE and 2018_F2F students showed 1.82 and 1.37 IPS in W13 and W6. 2019_DE, 2019_GE and 2019_U showed 0.89, 0.48 and 0.47 IPS in W15, W14 and W13.

For Normalization I, 2018_F2F showed 1.64 IPS in W10. 2019_GE and 2019_U showed 1.38 IPS in W15 followed by 2019_DE with 1.13 in W10 and W14. 2018_DE showed 0.73 IPS in W13 and W15.

For Normalization II, 1.36 and 1.18 IPS were made by 2018_F2F and 2019_GE in W15 by both. 1.06, 0.84 and 0.73 IPS were made by 2019_u, 2019_DE and 2018_DE in W15, W14 and W14.

For Relational Algebra 01, 1.45 IPS were made by 2019_DE in W3 followed by 2019_U and 2019_GE with 0.92 and 0.8 IPS in W3 and W2, respectively.

For Relational Algebra 02; 2.13, 0.86 and 0.6 IPS were made by 2019_DE, 2019_U and 2019_GE in W3.

The Relational Model showed 2.58 IPS by 2019_DE in W2 followed by 2019_U with 1.20 IPS in W3. 2019_GE students showed 0.86 IPS in W2.

The Topic Introduction was interacted 7.09 times by 2019_DE in W1 followed by 2018_F2F with 5.72 in W1 as well. 2019_DE, 2019_GE and 2019_U interacted 1.74, 1.2 and 0.69 times in W1, W4 and W1.

Overall, the theoretical course material was interacted most in first six and last three weeks but 2018_DE students made highest interactions that were 22 IPS in W1 whereas lowest interactions were made in W12 by 2019_DE.

9.4.4.2 Interactions with practical course material

For SQL Introduction, 2018_DE students made 3.45 IPS in W4 followed by 2018_F2F with 3.07 in W4. 2019_DE, 2019_GE and 2019_U students made 2.21, 0.9 and 0.88 IPS in W4, W5 and W4.

For SQL P2: Aggregates, 2.45 and 1.75 interactions were made by 2018_DE and 2018_F2F in W6. 2019_DE and 2019_GE showed 1.16 and 0.6 IPS in W56 and W5 whereas 2019_U showed 0.45 IPS in W6.

For SQL P2: WHERE, 2018_F2F and 2018_DE showed 2.82 and 2.45 IPS in W6. 1.37 and 1.18 IPS were noted for 2019_DE and 2019_GE in W5. 2019_U students showed 0.88 IPS in W6.

For SQL P3: order by and group by; 1.73, 1.47 and 1.32 IPS were made by 2018_DE, 2018_F2F and 2019_GE in W8. 0.87 and 0.84 interactions were made per student by 2019_DE and 2019_U in M-S B2 and W8.

For SQL P4: correlated subqueries, 2018_DE made 3 IPS followed by 2018_F2F with 2.21 IPS in W9. 2019_DE students made 1.24 IPS in W9. 0.78 IPS were made by 2019_GE and 2019_U in W8 and W9, respectively.

For SQL P4: subqueries, 3.36 IPS were made by 2018_DE and 2.5 IPS by 2018_F2F in W9. 2019_DE and 2019_U students made 1.55 and 1.05 IPS in W8 and W9 respectively whereas 2019_GE showed 0.74 in W9.

For SQL P5: sets, 3.09 and 2.31 IPS were made by 2018_DE and 2018_F2F in W9 followed by 2019_DE and 2019_GE with 1.32 and 1.3 IPS in W9 and W10. 2019_U students made 0.80 IPS in W10.

In SQL P6: multi-table joins, 3 IPS were noted for 2018_DE in W11 followed by 2018_F2F and 2019_DE with 2.11 and 1.68 IPS in W11. 2019_GE and 2019_U students made 1.02 and 0.71 IPS in W11 as well.

For SQL P7: create and alter table, 2018_DE and 2018_F2F students made 2 and 1.52 IPS in W12. 2019_DE, 2019_U and 2019_GE students showed 1.11, 0.61 and 0.58 IPS in W12.

For SQL P7: Insert, update, delete; 2.64 IPS were made by 2018_DE and 2.1 IPS by 2018_F2F in W12. 2019_DE students showed 1.95 IPS whereas 2019_GE and 2019_U showed 0.8 and 0.66 IPS in W12.

For SQL P7: views, 2018_DE and 2018_F2F students made 2.09 and 1.53 IPS in W12. 2019_DE, 2019_U and 2019_GE students showed 1.26, 0.60 and 0.4 IPS in W12, W12 and W13.

For SQL P8: Integrity enhancement features, 1.91 and 1.15 IPS were made by 2018_DE and 2018_F2F in W12. 0.87, 0.28 and 0.25 IPS were made by 2018_DE, 2018_GE and 2019_U in W12.

For SQL P8: transactions and access control, 2018_DE made 2 IPS in W13 whereas 2018_F2F showed 1.19 IPS in W12. 0.89, 0.7 and 0.41 IPS were made by 2019_DE, 2019_GE and 2019_U in W13.

All in all, 2018_DE students made highest interactions with SQL Introduction that were 3.45 in W4. Interestingly, the practical course material was interacted highly during the practical quizzes(checkpoints) in respective week of the quiz and showed triangular zero matrix otherwise.

9.4.5 Interactions with reflection quizzes

For background to databases, 28 IPS were made by 2018_DE students in W1 followed by 2018_F2F with 21.11 IPS in W2. 10.52, 8.61 and 8.13 IPS were made by 2019_GE, 2019_U and 2019_DE in W2, W1 and W1, respectively.

For Conceptual DB Design, 2018_DE and 2019_GE students made 7.64 and 5.32 IPS in W5. 2018_F2F, 2019_DE and 2019_U students showed 3.99, 2.82 and 1.38 IPS in W4.

For Database Software Development Lifecycle, 2018_DE and 2018_F2F students showed 8.36 and 4.59 IPS in W3. 2019_DE, 2019_GE and 2019_U students showed 3.26, 2.74 and 2.08 IPS in W3, W3 and W4.

For EER Modelling, 4 IPS were made by 2018_DE in W5 whereas 2019_GE showed 2.84 IPS in W5. 2018_F2F, 2019_DE and 2019_U showed 2.49, 1.74 and 0.60 IPS in W5, W4 and W4, respectively.

For ER Modelling, 23.09 IPS were made by 2018_DE in W4 followed by 2018_F2F and 2019_GE with 12.47 and 10.76 IPS in W4 and W3, respectively. 2019_DE and 2019_U students showed 7.21 and 4.94 IPSs in W4.

For Logical Modelling, the highest interactions were 5.18 made by 2018_DE in W10 whereas 2018_F2F followed it by 4.14 in W6. 2019_GE and 2019_DE made 2.56 and 2 IPS in M-SB2 and W7. 2019_U students did not make at lowest 1 interaction per student. The calculated IPS were 0.66 IPS in W7.

For Normalization, 2018_DE and 2018_F2F students showed 6.18 and 6.13 IPS in W13 and W10, respectively. 2019_GE students made 5.64 IPS in W10 followed by 2019_DE with 3.42 in W10 as well. 2.78 IPS were shown by 2019_U students in W7.

For relational algebra, 10.27, 9.37, 7.32 and 5.61 IPS were made by 2018_DE, 2018_F2F, 2019_GE and 2019_DE in W2, W2, W3 and W3, respectively. 2019_U made 3.47 IPS in W3.

2018_DE students made 14.84 IPS with SQL Introduction in W4 whereas 2018_F2F showed 13.33 IPS in W5 followed by 2019_DE and 2019_GE with 4.37 and 3.54 IPS in W4 and W5. 1.44 IPS were shown by 2019_U student sin W4.

For SQL P2: Aggregates, 2018_F2F students showed highest interactions out of all 5 groups which were 9.06 IPS in W6. 2018_DE followed it with 6.45 in W5. 2019_GE, 2019_DE and 2019_U students showed 2.2, 1.34 and 1.02 IPS in W5, W6 and W5, respectively.

For SQL P2: WHERE, 2018_F2F and 2018_DE showed 19.73 and 15 IPS in W6 and W5. 2019_GE students showed 4.54 IPS in W5. 2019_DE and 2019_U showed 2.92 and 1.98 IPS in W5.

For SQL P3: order by and group by, 13.64 IPS were made by 2018_DE in W8 followed by 2018_F2F with 12.94 in W6. 2019_GE and 2019_DE showed 3.52 and 2.92 IPS in M-SB2. 2019_U showed 1.45 IPS in W6.

The quiz for the Relational Model was interacted 9.36 and 7.43 times by 2018_DE and 2018_F2F in W2 followed by 2019_GE with 5.92 IPS in W3. 2019_DE and 2019_U students showed 4.21 and 3.17 in W2 and W3, respectively.

The highest number of interactions made with reflection quizzes were 28 IPS showed by 2018_DE students with Background to databases quiz in W1. Also, 2018_DE students made highest interactions in W4 that were 64.64 IPS. Moreover, 2018_DE students showed zero interactions in W15 for reflection quizzes whereas the lowest interactions were also made by 2018_DE in M-S B2 that were 0.18. Overall, first five weeks were the most interacting for it.

9.4.6 Interactions with practical quizzes (checkpoints)

2018_F2F students followed it with 14.41 in W5. 2019_U, 2019_DE and 2019_GE students showed 7.94, 7.89 and 7.14 interactions per stydent in W4, W5 and W5 respectively.

For checkpoint 2, 18.29, 12.87 and 11.84 IPS were shown by 2018_F2F, 2019_U and 2019_DE in W6. 2019_GE and 2018_DE students showed 8.04 and 7 IPS in W6.

For checkpoint 3, 18.85, 13.92, 11.30, 9.18 and 8.84 IPS were made by 2018_F2F, 2019_DE, 2019_U, 2018_DE and 2019_GE in W6.

For checkpoint 4, 20.42, 15.96, 13.18, 11.55 and 11.36 IPS were shown by 2018_F2F, 2019_U, 2019_DE, 2018_DE and 2019_GE in W8.

For checkpoint 5, 18.92 IPS were made by 2018_F2F in W8 followed 2019_U with 15.73 interactions per tsudent in W10. 2018_DE, 2019_DE and 2019_GE students made 12.18, 12.13 and 9.2 IPS in W8.

For checkpoint 6, 19.27 interactins per student were shown by 2018_F2F in W9. 2018_DE students followed it with 17.18 interactions per stduent in W9. 2019_DE, 2019_U and 2019_GE students made 13.95, 12.13 and 8.78 IPS in W9.

For checkpoint 7, 2019_DE studnets showed highest interactions that were 19.32 followed by 2018_F2F and 2019_U with 17.02 and 12.48 in W9. 2019_GE and 2018_DE stuednts showed 10.14 and 9.91 IPS in W9.

For checkpoint 8, 2018_F2F, 2019_DE, 2018_DE, 2019_U and 2019_GE students showed 17.56, 13.97, 13.27, 11.65 and 9.74 IPS in W10.

For checkpoint 9, 22.09, 16.11, 10.21, 9.21 and 8.18 IPS were made by 2018_DE, 2018_F2F, 2019_DE, 2019_U and 2019_GE in W10.

For checkpoint 10, 2018_DE students made 47 IPS in W11 followed by 2018_F2F with 19.84 interactions per tsudent in W11. 2019_DE, 2019_U and 2019_GE students showed 16.89, 12.44 and 8.04 interactions per tsudnet in W11.

For checkpoint 11, 2018_DE and 2019_DE students showed 31 and 16.53 IPS in W11. 2018_F2F, 2019_U and 2019_GE students showed 13.28, 11.38 and 7.22 interactisn per student in W11.

For checkpoint 12, 19.63, 17.06, 16.03, 13.36 and 7.64 IPS were shown by 2018_F2F, 2019_U, 2019_DE, 2018_DE and 2019_GE in W12.

For checkpoint 13, 16.82, 13.92, 13.75, 12.69 and 6.76 IPS were made by 2018_DE, 2019_DE, 2018_F2F, 2019_U and 2019_GE in W12.

For checkpoint 14, 2019_GE students made 8.12 interactios per tsudent in W13 followed by 2019_U with 8.09 in same week. 7.95 and 7.79 interations per student were shown by 2018_F2F and 2019_DE whereas 6.64 interactios per student were made by 2018_DE stddeunts in W13.

For last checkpoint 15, too less intercations were made. The highest interactiosn for this checkpoint were 3.18 made by 2019_DE followed by 2019_GE with 3.16 in W13. 2018_F2F, 2019_U and 2018_DE students showed 2.97, 2.50 and 2.45 IPS in W13.

As the checkpoints were due in W6, W8, W9, W11, W12 and W13 so from all of the above graphs, it is clear that the checkpoints were mostly interacted in their respective due weeks. Also, the highest intercations showed staircase pattern from W8 till W13 as the last checkpoint was due in W13. The highest interactions were made with checkpoint 10 (47 IPS) by 2018_DE students. Additionally, nil interactions were noted before and after due weeks of checkpoint.

9.4.7 Interactions with external tools

2018_DE group used assignment extension tool the most that was 2.36 times in W12 followed by 2019_DE with 0.45 in W13 as Data Modelling Assignment Part II was due in W13. 2019_GE, 2019_U and 2018_F2F interacted with assignment extension less than once that were 0.16, 0.13 and 0.07 in W7, W7 and W13 as the Data Modelling Assignment I was due in Week 7.

For online structured examination portal, 2019_DE students interacted 1.58 times in W15 followed by 2018_DE, 2019_GE and 2019_U by 0.82, 0.42 and 0.13 interactions pre student in W15.

The Statement of Assessment methods was interacted by 2018_DE students by 2.09 times followed by 2018_F2F with 1.21 IPS in W1. 2019_DE, 2019_GE and 2019_U students showed 0.82, 0.8 and 0.75 IPS in W1 as well.

Overall, 2018_F2F students interacted highly with SAM (1.22 IPS in W1), 2018_DEs interacted highly with Assignment Extension Request (2.36 IPS in W12) whereas 2019_DEs interacted highly with Online Structured Oral Examination Portal (1.58 IPS in W15). In addition to this, from the topic calendar of the COMP1711 course, it was observed that the assignments were due in W2, W7, W12, W13 and W14. It is concluded that the assignment extension requests were made either a week before the due week or in the due week. On the flip side, 2018_F2F did not interacted with Online Structured Oral Examination Portal.

For checkpoint 1, 26.64 interactions per tsudent were made by 2018_DE in W5.

9.4.8 Interactions with F2F notes

For F2F 01, 2018_DE, 2018_F2F, 2019_DE, 2019_GE and 2019_U students made 1.55, 1.06, 0.63, 0.58 and 0.42 IPS in W2, W2, W1, W1 and W1, respectively.

For F2F 01 notes, 2018_DE and 2018_F2F students made 1.09 and 0.86 IPS in W2 followed by 2019_DE, 2019_GE and 2019_U with 0.50, 0.48 and 0.32 IPS in W1.

For F2F 02, 2018_DE and 2018_F2F showed 0.82 and 0.34 IPS in W2 and W3 whereas 2019_DE, 2019_GE and 2019_U followed it with 0.29, 0.14 and 0.09 IPS in W2; W2 and W3; and W3 respectively.

For F2F 02 notes, 2018_DE and 2018_F2F showed 0.36 and 0.26 IPS in W5 as 2019_DE, 2019_GE and 2019_U showed 0.13, 0.1 and 0.06 IPS in W2, W2 and W3.

For F2F 03, 0.29, 0.26 and 0.18 IPS were made by 2019_U, 2019_GE and 2019_DE student in W3.

For F2F 03 notes, 2019_DE, 2019_GE and 2019_U made 0.11, 0.08 and 0.04 IPS in W3; W3 and W4; and W4, respectively.

For F2F 04, 2018_DE, 2018_F2F, 2019_GE, 2019_U and 2019_DE students made 0.64, 0.33, 0.26. 0.23 and 0.16 IPS in W5, W5, W4, W4 and W4.

For F2F 04 notes, 2018_DE, 2018_F2F, 2019_DE, 2019_GE and 2019_U showed 0.45, 0.36, 0.8, 0.1 and 0.09 IPS in W5; W5; W4, W6 and W7; W4 and W4.

For F2F 06, 0.27, 0.22, 0.24, 0.16 and 0.09 interaction per student were shown by 2018_DE, 2018_F2F, 2019_DE, 2019_GE and 2019_U in W8 and W10; W7, W6, W6 and; W6 and W7.

For F2F 06 notes, 2018_DE, 2018_F2F, 2019_GE, 2019_DE, and 2019_U showed 0.36, 0.16.014, 0.11 and 0.04 IPS in W13, W9, W13, W13 and W13, respectively.

For F2F 07, 1.36, 1.1, 0.36, 0.24 and 0.20 IPS were shown by 2018_DE, 2018_F2F, 2019_GE, 2019_DE, and 2019_U in W7.

For F2F 09 notes, 2018_DE, 2018_F2F, 2019_GE, 2019_DE and 2019_U showed 0.64, 0.17, 0.2, 0.13 and 0.03 IPS in W13, W9, W13, W13 and W13, respectively.

For F2F 10a notes, 0.32 IPS were made by 2019_DE and 2019_GE in W10 and W15, respectively. 2018_DE, 2018_F2F and 2019_U students showed 0.27, 0.25 and 0.11 IPS in W13 and W15; W10 and W15.

For F2F 11, 2018_DE and 2018_F2F students showed 0.82 and 0.67 interaction per student in W12 and W13.

For F2F 11 notes, 2018_DE and 2018_F2F students made 1interaction per student and 0.4 IPS in W13, respectively.

From all the above, the highest interactions made were 1.55 IPS by 2018_DE students in W2. Also, F2F notes were interacted highly from W1 to W4 and in W7, W13, and W15 and were interacted lower otherwise.

9.4.9 Interactions with chapter (PDFs)

9.4.9.1 Interactions with theoretical course material's chapter PDFs

For Case study: University Accommodation Specification, 2018_DE and 2018_F2F students made 0.91 and 0.54 IPS in W5 whereas 2019_U showed similar interactions as of 2018_F2F in W5 as well. 2019_DE and 2019_GE students showed 0.50 and 0.44 IPS in W5.

For Conceptual DB Design, 0.64, 0.37, 0.4, 0.34 and 0.27 IPS were made by 2018_DE, 2018_F2F, 2019_GE, 2019_DE and 2019_U in W5, W7, W5, W1 and W7; and W7, respectively.

For Database Architecture and Web, 0.64 and 0.48 IPS were made by 2018_DE and 2019_GE in W2. 2018_F2F and 2019_U students showed 0.47 interactions in W2 whereas 2019_DE students made 0.34 IPS in W2 as well.

2019_GE students made 0.6 IPS with Database Environment in W2 followed by 2018_DE with 0.55 in W1 and W2. 2018_F2F, 2019_U and 2019_DE students followed it with 0.48, 0.44 and 0.39 IPS in W2, W2 and W1, respectively.

1.27 and 1.1 IPS were noted for Database Software Development Lifecycle by 2018_DE and 2018_F2F in W4. 2019_GE and 2019_DE followed it by with 0.68 and 0.45 IPS in W4 and W3 whereas 2019_U students showed 0.31 IPS in W4.

For EER Modelling, 1.55 and 0.76 IPS were made by 2018_DE and 2018_F2F in W5 and W4. 2019_GE followed it with 0.44 IPS in W5 whereas 2019_DE and 2019_U made 0.39 IPS in W7.

2018_DE students showed 1.73 IPS in W4 followed by 2018_F2F with 1.08 in W4 as well. 2019_GE, 2019_U and 2019_DE followed it with 0.74, 0.45 and 0.37 interactions pre student in W4.

For Introduction to Database, 2018_DE students made 1 interaction per student followed by 2019_GE with 0.94 in W1. 2018_F2F, 2019_DE and 2019_U students made 0.82, 0.71 and 0.65 IPS in W1.

For Logical Modelling II, 2019_GE showed 0.72 IPS in W9 followed by 2018_F2F with 0.66 in W13. 2018_DE and 2019_DE students showed 0.55 IPS in W9 and W13, respectively. 2019_U students showed 0.50 IPS in W13 as well.

Further for Normalization, 2018_F2F students showed 0.75 IPS in W15 followed by 2018_DE with 0.45 IPS in W13. 2019_DE, 2019_GE and 2019_U students showed 0.42, 0.32 and 0.30 IPS in W10, W15 and W15, respectively.

For relational algebra, 1.36 IPS were noted for 2018_DE in W2 as 2019_GE followed it with 0.61 IPS in W3. 2019_U, 2019_DE and 2018_F2F students showed 0.51, 0.45 and 0.18 IPS in W3, W3 and W2.

Lastly, for the relational model, 1.27 IPS were shown by 2018_DE followed by 2018_F2F with 1.02 IPS in W2. 2019_GE students made 0.68 IPS in W3 as 2019_U and 2019_DE followed it with 0.54 and 0.42 IPS in W3.

Overall, the highest number of IPS were 1.55 by 2018_DE with EER Modelling in W5 but by weekly data, 5.45 IPS were made by 2018_DE for theoretical courses' PDFs in W5. Also, the pattern for interactions noted for all groups was like F2F notes. Mostly, less than 1 interaction per student was noted in rest of the weeks.

9.4.9.2 Interactions with practical chapter PDFs

For SQL Introduction, 2018_DE showed 0.82 IPS in W4 followed by 2018_F2F with 0.57 IPS in W4 as well. 2019_DE, 2019_GE and 2019_U showed 0.50 in W6, 0.46 in W4 and W5, and 0.42 IPS in W4, respectively.

For SQL P2: Aggregates, 1.51 IPS were shown by 2018_F2F in W6. 2018_DE students showed 1 interaction per student in W8. 0.45, 0.44 and 0.4 IPS were noted for 2019_DE, 2019_U and 2019_GE in W6, W5 and W5 also.

For SQL P2: WHERE, 1.77, 1.18, 0.58, 0.50 and 0.48 IPS were shown by 2018_F2F, 2018_DE, 2019_U, 2019_DE and 2019_GE in W6, W8, W5, W6 and W5, respectively.

Further for SQL P3: order by and group by, 1.45 and 0.89 IPS were shown by 2018_DE and 2018_F2F in W8. Also 2019_DE, 2019_U and 2019_GE and showed 0.47, 0.39 and 0.34 IPS in W8.

SQL P4: subqueries and correlated was interacted 1.64 times by 2018_DE in W9 as interactions by 2018_F2F were pretty close to 2018_DE that were 1.54 IPS in W9 as well. 2019_DE students made 0.74 IPS as 2019_U students made 0.60 IPS in W9 whereas 2019_GE showed 0.36 IPS in W8.

In SQL P5: sets, 1.33 and 1.18 IPS were made by 2018_F2F and 2018_DE in W10 followed by 2019_DE and 2019_U with 0.68 and 0.51 IPS as 2019_GE students showed 0.38 IPS in W10 as well.

SQL P6: Multi-table joins, 1.37 IPS were shown by 2018_F2F and 2018_DE followed it with 0.82 IPS in W11. 0.76 and 0.41 IPS were noted for 2019_DE and 2019_U in W11. 2019_GE students made 0.22 IPS in W11 and W13 also.

For SQL P7: create and alter table, 1.55 and 1.24 IPS were made by 2018_DE and 2018_F2F in W12. 2019_U students showed 0.53 IPS in W12 as 2019_DE and 2019_GE showed 0.47 and 0.18 IPS in W12.

For SQL P7: INSERT, UPDATE, DELETE; 1.36 and 1.35 IPS were noted for 2018_DE and 2018_F2F as 0.61 and 0.47 IPS were seen for 2019_U and 2019_DE in W12 but 2019_GE showed 0.18 IPS in W10.

For SQL P7: views, 1.34 IPS were made by 2018_F2F in W12. 2018_DE followed it with 0.91 IPS in same week. 2019_DE, 2019_U and 2019_GE showed 0.42, 0.40 and 0.14 IPS in W12 also.

For SQL P8: Integrity enhancement features, 2018_DE students interacted 0.64 times in W12 and W13. 2018_F2F students interacted 0.55 times in W12. 2019_DE, 2019_U and 2019_GE students interacted 0.42, 0.30 and 0.12 times in W12 as well.

For SQL P8: Transactions and access control, 1.09 IPS made by 2018_DE followed by 2018_F2F with 0.82 IPS in W13. 2019_U students showed 0.38 IPS as 2019_DE and 2019_GE followed it with 0.32 and 0.28 IPS in W13.

Overall, the highest IPS were made with SQL P2: WHERE by 2018_F2F which were 1.77 in W6. In addition to this, these PDFs were also interacted in the due weeks of

the checkpoints that were W6, W8, W9, W11, W12 and W13. Moreover, nil interactions were observed before two weeks of the due dates of the checkpoints.

9.4.10 Interactions with assignments

For the Data Modelling Assignment Part I- Handin, 2018_DE students made 7.73 IPS in W7. 2018_F2F students followed it with 6.08 IPS in W8. 2019_DE, 2019_GE and 2019_U students made 2.03, 1.78 and 1.95 IPS in W7, W7 and W9. For the Data Modelling assignment part I-resubmission, 0.21 IPS made by 2018_F2F followed by 2019_GE with 0.18 IPS in W11 whereas negligible IPS were made by 2019_U.

For part A(Data Modelling Assignment part II) assignment, 9.18 IPS made by 2018_DE followed by 2018_F2F with 7.31 IPS in W14. 2019_GE, 2019_DE and 2019_U students made 1.88, 1.79 and 0.27 IPS in W14, W14 and W15. For part B(Data Modelling Assignment part II) assignment, 2018_DE and 2018_F2F students made 9.64 and 6.82 IPS in W14. 2019_GE followed it by 2.52 IPS in W14 whereas 2019_DE and 2019_U students showed 1.97 and 0.31 IPS in W14 and W15.

For research report, 2019_GE and 2019_U students showed 2 and 0.09 IPS in W12. For structural Oral Examination and supplementary Oral Examination, nil interactions were made by 2018_F2F, 2018_DE and 2019_DE.

Overall, from the SAM provided by the supervisor showed that assignments were due in W2, W7, W12,W13 and W14. After observing all the graphs, it showed the same pattern for the highly interactions in due weeks of the assignments. Additionally, Data Modelling Assignment Part I- Handin , Part A (Data Modelling Assignment Part II) and Part B (Data Modelling Assignment Part II) were interacted highly by all groups in W7 and W14 whereas Research Report (GE only) was only interacted by 2019_GE students in W12. Moreover, the weightage of the Data Modelling Assignment Part I- Handin and Part A (Data Modelling Assignment Part II) + Part B (Data Modelling Assignment Part II) were 30% each of the total weightage of the course.

9.4.11 Interactions with muddiest point

9.4.11.1Interactions with Muddiest points for theoretical material

2018_DE students made 0.64, 0.36, 0.36, 0.36 and 0.55 IPS with background to databases, Conceptual DB Design, Database Software Development Lifecycle, EER Modelling and ER Modelling whereas 2018_F2F students made 0.82, 0.24, 0.22, 0.28 and 0.2 IPS in first five weeks.

For final SQL quiz, 0.06 and 0.09 IPS in twelfth and thirteenth week and for Logical Modelling , 0.24 and 0.18 IPS were seen in W6 and W10 for 2018_F2F and 2018_DE. For Normalization, Oral Exam, Relational Algebra, and the relational model; 2018_F2F made 0.14 in W10, 0.03 in W15, 0.56 in W4 and 0.46 in W2 whereas 2018_DE showed 0,0, 0.82 in W2 and 0.73 IPS in W3.

All in all, the muddiest point for theoretical material was interacted in first six, W8 and W10 with a huge difference.

9.4.11.2Interactions with Muddiest points for practical material

For SQL intro, 0.36 and 0.45 IPS were noted for 2018_F2F and 2018_DE in W4 and W5. Surprisingly, for SQL P2 Aggregates and SQL P2 where, 0.49 and 0.36 IPS were made by 2018_F2F and 2018_DE in W6. For SQL P3: order by and group and SQL P4: subqueries, 2018_F2F showed 0.23 and 0.13 IPS in W6 and W9 whereas 2018_DE showed 0.27 and 0.18 IPS in W8 and W9.

For SQL P5: sets and SQL P6: FK and Commit, 0.11 and 0.03 IPS were made by 2018_F2F in W10 and W13 whereas 2018_DE showed 0.09 IPS in W10 and W13.

The SQL P6: multi-table joins showed 0.09 IPS by 2018_F2F and 2018_DE in W10 and W11 whereas for SQL P6: Views, Create and Update, 0.07 and 0.09 IPS were made in W12 by 2018_F2F and 2018_DE.

All in all, the highest IPS made for SQL P2: Aggregates and SQL P2: WHERE that were 0.49 in W6 as lowest IPS were shown by 2018_F2F that were 0.03 in W 13. Also, the muddiest point for practical material was interacted highly in W4, W5, W6, W8 and W9.

10 Inferential Statistics

The Welch's T-test has been performed between different groups and years to find if there are significant differences between them using mean (*M*), variance (*SE*, by taking square-root of the variance), degrees of freedom (*df*) , and probability for two tail case (*p*). This statistic has been performed between different groups within same year and same groups within different years for checkpoints, tutorials, SCORM package videos theoretical and practical material, reflection quizzes, and assignments as shown in table 5.

10.1 2018_DE vs 2018_F2F

An independent samples t-tests for 2018_DE vs 2018_F2F with checkpoints, tutorials, SCORM package videos theoretical and practical material, reflection quizzes, and assignments indicated that the number of interactions by 2018_DE were not significantly different than the 2018_F2F is clear from the table.. as $p > .05$ for all modules.

10.2 2019_DE vs 2019_GE

For 2019_DE vs 2019_GE, an independent samples t-tests indicated that the number of interactions by 2019_DE were not significantly different than the 2019_GE as $p > .05$ except for reflection quizzes where $p < .05$ from table.. .

10.3 2019_DE vs 2019_U

The number of interactions by 2019_DE were not significantly different than 2019_U except for SCORM package videos theoretical and practical material where $p < .05$ as indicated by an independent samples t-tests.

10.4 2019_GE vs 2019_U

An independent samples t-tests for 2019_GE vs 2019_U indicated that the number of interactions by 2018_GE were not significantly different than the 2019_U excepting checkpoints, reflection quizzes and assignments as $p > .05$.

10.5 2018_DE vs 2019_DE

The t-tests performed with an independent samples for 2018_DE and 2019_DE indicated that the number of interactions for tutorials, checkpoints, SCORM package videos theoretical and practical material by 2018_DE were not significantly different than the 2019_DE whereas for reflection quizzes and assignments, $p < .05$ that suggested significant differences in the level of interactions.

10.6 2018_F2F vs 2019_U

The number of interactions by 2018_F2F were significantly different than 2019_U for tutorials, and reflection quizzes whereas for checkpoints, SCORM package videos theoretical and practical material, and assignments as $p > .05$ indicated by an independent samples t-tests.

Table 5 Inferential statistics

Groups Compared	Statistical units	Modules/ Group for mean and variance	Tutorials	Checkpoints	Reflection quizzes	SCORM package videos (Theoretical material)	SCORM package videos (practical material)	Assignments
2018_DE (G1) vs 2018_F2F (G2)	*M(SE)*	G1	14.8(13)	289(496)	323(139)	100(34.3)	46.6(44.6)	41.3(19.8)
		G2	14.4(9.65)	347(281)	324(197)	83.7(62.7)	54.6(49.3)	40(25.9)
	df		11	11	15	18	13	14
	p		*p* > .05	*p* > .05	*p* > .05	*p* > .05	*p* > .05	*p* > .05
	t(df) = stat		*t*(11) = 0.0902	*t*(11) = -0.379	*t*(15) = -0.019	*t*(18) = 1.39	*t*(13) = -0.560	T(14) = 0.205
2019_DE (G1) vs 2019_GE (G2)	*M(SE)*	G1	11.6(8.98)	368(351)	153(137)	77.1(49.9)	47.3(38)	12.6(11)
		G2	12.6(9.37)	288(150)	240(187)	63.3(57.8)	35.9(45.7)	16.1(8.22)
	df		70	41	73	72	73	57
	p		*p* > .05	*p* > .05	*p* < .05	*p* > .05	*p* > .05	*p* > .05
	t(df) = stat		*t*(70) = -0.472	*t*(41) = 1.22	*t*(73) = -2.32	*t*(72) = 1.10	*t*(73) = 1.18	T(57) = -1.52
2019_DE (G1) vs 2019_U (G2)	*M(SE)*	G1	14.8(8.98)	368(351)	153(137)	77.1(49.9)	47.3(38)	12.6(11)
		G2	10.9(7.48)	366(288)	115(138)	49.7(49.8)	25(34.6)	10.3(7.66)
	df		10	42	48	47	45	39
	p		*p* > .05	*p* > .05	*p* > .05	*p* < .05	*p* < .05	*p* > .05
	t(df) = stat		*t*(10) = 0.961	*t*(42) = 0.023	*t*(48) = 1.42	*t*(47) = 2.84	*t*(45) = 3.09	T(39) = 1.11
2019_GE (G1) vs 2019_U (G2)	*M(SE)*	G1	12.6(9.37)	288(150)	240(187)	63.3(57.8)	35.9(45.7)	16.1(8.22)
		G2	10.9(7.48)	366(288)	115(138)	49.7(49.8)	25(34.6)	10.3(7.66)
	df		57	131	55	59	55	63
	p		*p* > .05	*p* < .05	*p* < .05	*p* > .05	*p* > .05	*p* < .05
	t(df) = stat		*t*(57) = 1.070	*t*(131) = -2.35	*t*(55) = 4.02	*t*(59) = 1.37	*t*(55) = 1.42	T(63) = 4.07
	M(SE)	G1	14.8(13)	289(496)	323(44.6)	100(34.3)	46.6(44.6)	41.3(19.8)

2018_DE (G1) vs 2019_DE (G2)		G2	11.6(8.98)	368(351)	153(38)	77.1(49.9)	47.3(38)	12.6(11)
	df		13	14	17	25	15	12
	p		*p* > .05	*p* > .05	*p* < .05	*p* > .05	*p* > .05	*p* < .05
	t(df) = stat		*t*(13) = 0.746	*t*(14) = -0.487	*t*(17) = 3.50	*t*(25) = 1.74	*t*(15) = -0.050	T(12) = 4.56
2018_F2F (G2) vs 2019_U (G2)	*M(SE)*	G1	14.4(9.65)	347(281)	324(197)	83.6(62.7)	54.6(49.3)	40(25.9)
		G2	10.9(7.48)	366(288)	115(138)	49.7(49.8)	25(34.6)	10.3(7.66)
	df		177	216	164	180	164	111
	p		*p* < .05	*p* > .05	*p* < .05	*p* < .05	*p* < .05	*p* < .05
	t(df) = stat		*t*(177) = 3.04	*t*(216) = -0.530	*t*(164) = 9.12	*t*(180) = 4.52	*t*(164) = 5.18	T(111) = 11.10

11 Limitations

Firstly, the information for type 1 (whole IPS) and type 2 (hourly IPS) has been extracted using the whole database. For 2018, the interactions were made between 1/01/2018-30/06/2019 whereas for 2019, interactions were made between 25/02/2019-26/09/2019. On the other hand, for type 3 (weekly IPS), database was restricted as the university's 14 academic weeks. For 2018, academic period started on 26/02/2018 and ended on 24/06/2018 whilst for 2019, it started on 4/03/2019 and ended on 30/06/2019. Secondly, the IPS calculated is the average of the interactions made by each group. Thirdly, nil interactions have been ignored i.e. they are not counted as the lowest interactions. Finally, inferential statistics has been done using Welch's t-test only.

12 Discussion

For the best engagement with online learners, the time should be well spent to produce material and should be qualitative. Also, qualitative support should be provided to the teacher and students during the delivery of online classes. Educational facilitation and creation of friendly social environment by the online instructors can impact positively on students. (Keengwe & Kidd, 2010) (Perry & Pilati, 2011). The distance in online learning can be reduced by increasing number of interactions with teacher as it helps to understand content in better way (Frey, 2018). In online education, the teacher knows a student by the types of interaction student use to approach course material whereas, in face-to-face learning, the teacher can see the facial expressions of the students that they are getting the idea what is being taught or not, so they emphasize on it to help students (Gruendemann, 2011) (Perry & Pilati, 2011). Moreover, face-to-face students interact with other students to discuss and exchange their ideas (Othman, Pislaru, & Impes, 2013). Gruendemann (2011, pp.676-680) discussed that in medical fields, as the organizations move towards online learning, students started approaching more towards face-to-face learning. In short, face-to-face learning is the result of body language, facial expressions, and caring teachers. It is the best way to resolve problems that emerged from misunderstanding of text mails, that are sometimes unclear about what the teacher wants to convey (Gruendemann, 2011, pp. 676-680). In addition to this, traditional learning is considered as most effective to grab content quickly and easily. Distance learning is time independent and provide flexible infrastructure so that students can gain more digital education with high degree of accuracy. Online learning has become an integral part of mainstream society (Harasim, 2000, p. 59) and is considered as the major element in the higher education matrix but it has also been argued that online learning is not for every student nor for every faculty (Perry & Pilati, 2011, p. 95). To make it worthwhile, lectures are recorded, and presentations are made to deliver content (Pandza & Masic, 2010). Also, student can ask questions and get answers within few days for any problem through e-mails (Perry & Pilati, 2011). Harry (1999) stated that distance learning has also been taken as economic and social tool for information society by the Governments because it is planned systematically but according to Pandza and Masic (2010, p.230) and Chen and He (2013), this approach cannot replace face-to-face communication completely and has not been accepted

globally. Additionally, F2F(U), GE and DE students showed differences in the level of interactions. The students with same delivery method but different year also showed variance for the interactions they made. 2018_DE and 2019_DE students belong to same delivery method that is distance education but there's huge difference for the interactions made by them. 2018_DE students made the highest IPS as compared within the 5 groups. Similarly, 2018_F2F and 2019_U students had face-to-face approach in which 2018_F2F students showed tremendous amount of interactions whereas 2019_U students contributed to the least amount of interactions in every activity. The interactions made by 2019_GE group lies in between both (F2F and DE) the approaches. Also, the inferential statistics was performed using Welch's t-test for checkpoints, tutorials, reflection quizzes, SCORM package videos with theoretical and practical material and, assignments. The t-tests for 2018_DE and 2018_F2F does not show significant differences in the level of interactions for any module as 2018_F2F group showed highest IPS after 2018_DE. The means and variances for majority of the modules were quite similar and the degrees of freedom lies between 11 and 18. 2019_DE and 2019_GE groups also does not show significant differences excepting reflection quizzes and degrees of freedom lie between 41 and 73. The means and variances for tutorials, SCORM package videos theoretical and practical material and assignments were similar in both groups. 2019_DE and 2019_U groups showed significant differences in the level of interactions with SCORM package videos with theoretical and practical material while other modules do not. The distance education groups in both 2018 and 2019 years show differences for assignments and reflection quizzes whereas for other modules, means and variances were very close. Also, 2018_F2F and 2019_U showed 2nd highest IPS and least IPS in majority of the modules and according to t-tests, the groups showed significant differences in interactions except for checkpoints.

Overall, the significant differences were seen for

-tutorials by 2018_F2F vs 2019_U,
-checkpoints by 2019_GE vs 2019_U,
-reflection quizzes by 2019_DE vs 2019_GE, 2019_GE vs 2019_U, 2018_DE vs 2019_DE, and 2018_F2F vs 2019_U
-SCORM package videos with theoretical and practical material by 2019_DE vs 2019_U and for
-assignments by 2019_GE vs 2019_U, 2018_DE vs 2019_DE, and 2018_F2F vs 2019_U.

13 Conclusion

All the groups showed differences in the level of interactions. Also, from the data analysis, it is concluded that 2018_DE students that were fully online and only 11 students made highest interactions in every module. The highest number of IPS were made with reflection quizzes that were 59.18 whereas by weekly data, 64.64 IPS were made in W4 by 2018_DE students. Further, the highest IPS made with checkpoints were 48.73 by 2018_DE with checkpoint 10 however by weekly interactions, 78.55 IPS were made in W10 (constituted of 47 IPS with checkpoint 10 and 37 IPS with checkpoin11). The tutorial files were interacted most in their respective weeks that

have highest of 3.09 IPS in W3 by 2018_DE but actual interactions were 9.05 IPS with tutorial 3-Week 04 by 2018_DE. Additionally, the interactions were made mostly between 8am to 1am (midnight) but the highly active time period throughout the semester was 1:00pm to 1:59pm except some modules like assignments that were interacted 24 hours. Also, the highest IPS by a group were 174.5 IPS between 4:00pm to 4:59pm by 2018_DE. At the same time, lowest IPS were 0.86 by 2019_GE (tutorial 6) and 0.95 by 2019_U (HowtoUniLife). Moreover, it is concluded that the interactions in the different modules of the course are interdependent. The interactions with theoretical and practical course material was highly interacted when practical quizzes (checkpoints) and reflection quizzes were due. The assignments were interacted mostly in the due weeks as well. Students were doing their work in which week it was due rather than to leave it for last minute. Graduate entry and Undergraduate groups of 2019's interactions were significantly different in half of the modules analysed. Module wise, 4 groups showed significant differences in the interactions for reflection quizzes. 2018_DE students made highest and 2018_F2F students made 2nd highest IPS according to analysis done in section 9 and inferential analysis also showed that the interactions were not significantly different. All in all, the analysis in section 9 and 10 shows similar results.

14 Future directions

As the interactions with the modules have been seen, the data regarding the attendance and grades could be extracted. It should be investigated whether students who interacted most, also go on to receive better grades than those who interacted less? Do face-to-face students demonstrate an adequate rate of attendance? Do online students attend the tutorial sessions? Additionally, surveys can be performed for students who interacted less or who did not interact to know the reasons .

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16 Appendix A- Tables and Graphs for IPS in type 2 and type 3

Groups	Total Number of students	Tutorial 01	Tutorial 02	Tutorial 03	Tutorial 04	Tutorial 05	Tutorial 06
2018_F2F	100	2.43	2.17	3.80	2.26	1.69	2.10
2018_DE	11	3.73	3.36	3.27	1.73	1.55	1.18
2019_DE	38	2.42	1.37	1.89	1.97	1.21	0.87
2019_GE	50	1.98	1.70	2.04	2.08	1.52	0.86
2019_U	173	1.89	1.80	1.99	1.54	1.03	0.73

Table 6 IPS with tutorial files by all groups

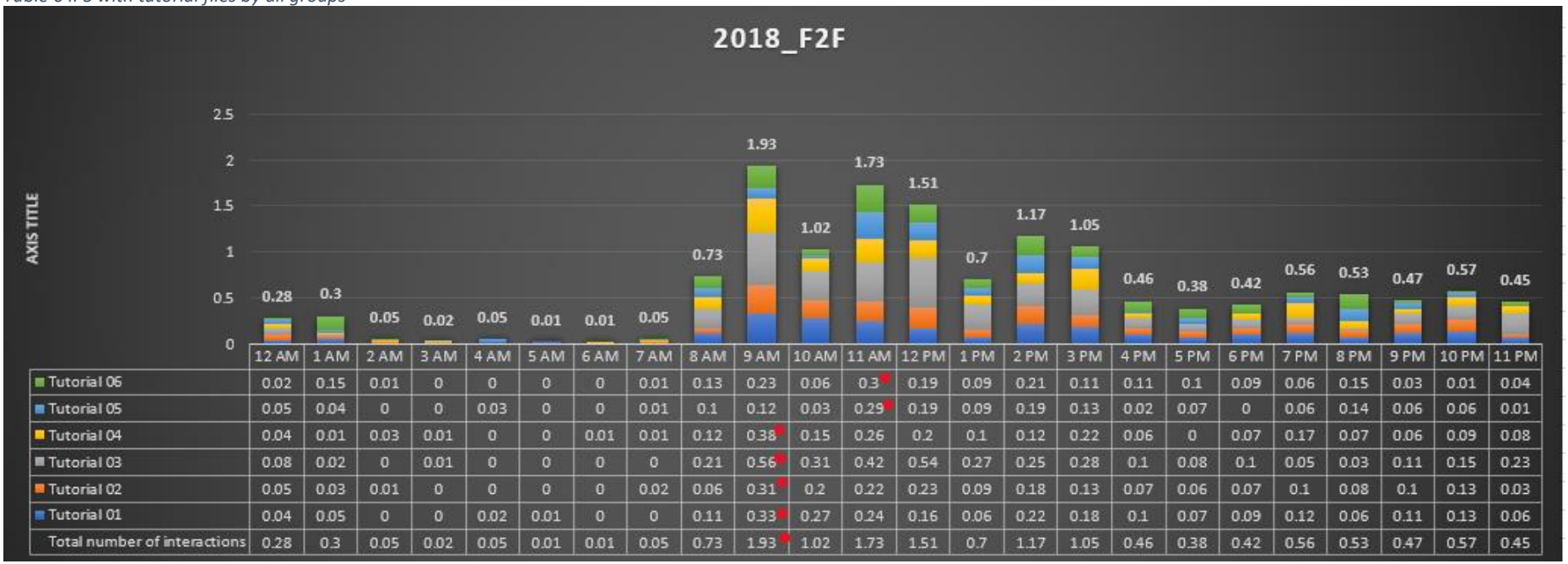
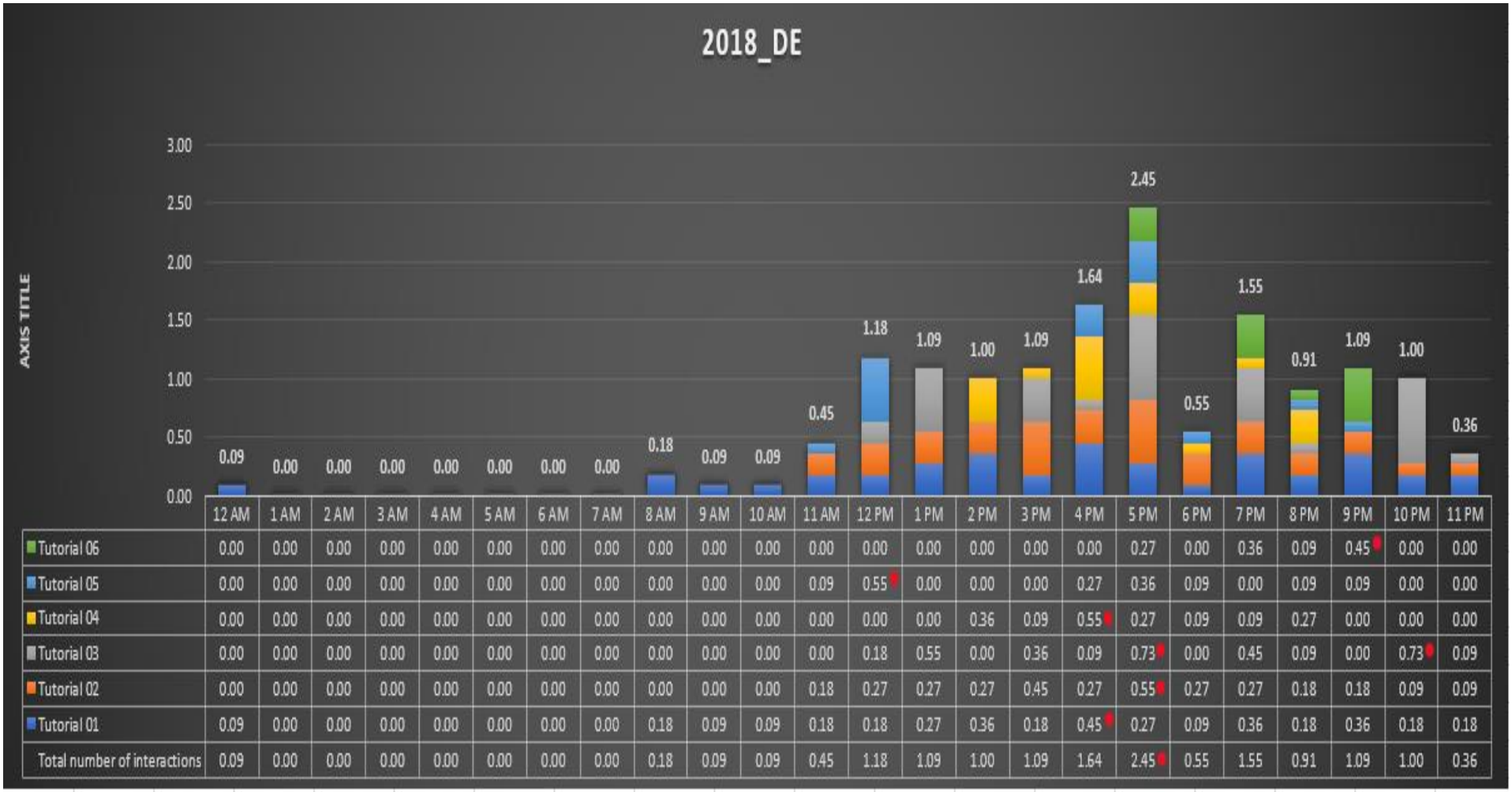
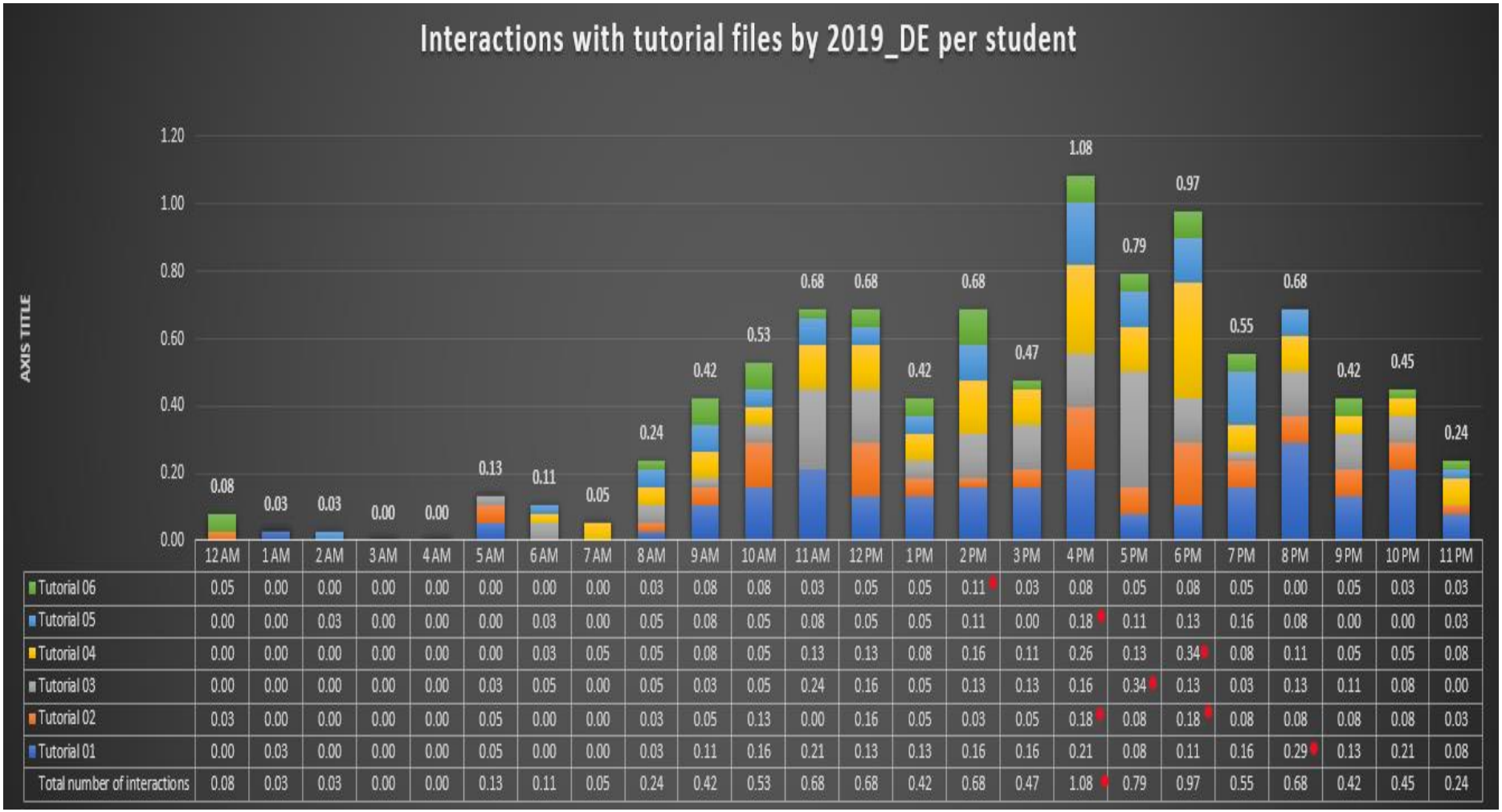


Figure 9.3 2 Number of interactions for tutorial files by 2018_F2F per student with time



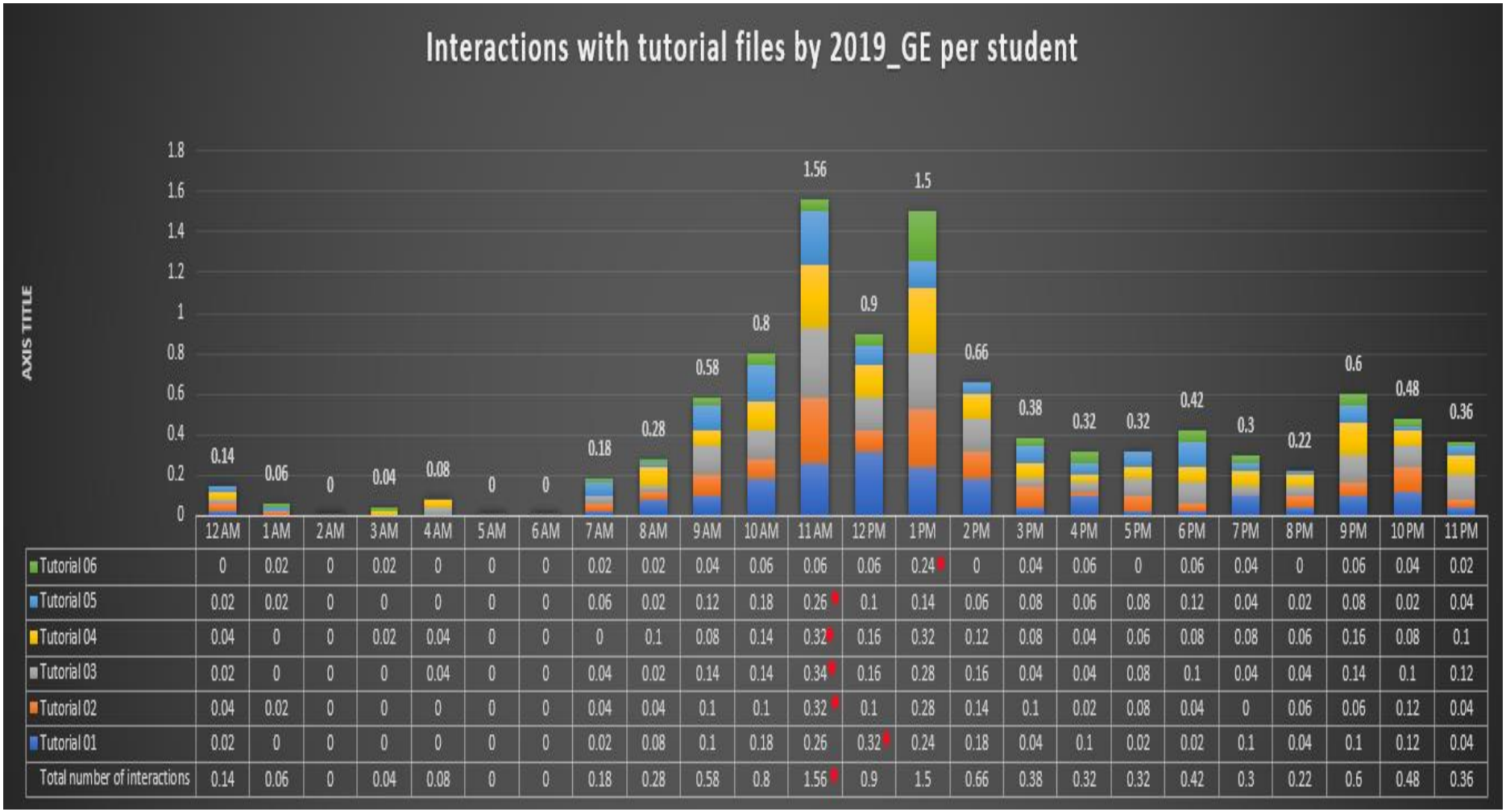
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Tutorial 06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.36	0.09	0.45	0.00	0.00
Tutorial 05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.55	0.00	0.00	0.00	0.27	0.36	0.09	0.00	0.09	0.09	0.00	0.00
Tutorial 04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.09	0.55	0.27	0.09	0.09	0.27	0.00	0.00	0.00
Tutorial 03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.55	0.00	0.36	0.09	0.73	0.00	0.45	0.09	0.00	0.73	0.09
Tutorial 02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.27	0.27	0.27	0.45	0.27	0.55	0.27	0.27	0.18	0.18	0.09	0.09
Tutorial 01	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.09	0.09	0.18	0.18	0.27	0.36	0.18	0.45	0.27	0.09	0.36	0.18	0.36	0.18	0.18
Total number of interactions	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.09	0.09	0.45	1.18	1.09	1.00	1.09	1.64	2.45	0.55	1.55	0.91	1.09	1.00	0.36

Figure 9.3 3 Number of interactions for tutorial files by 2018_DE per student with time



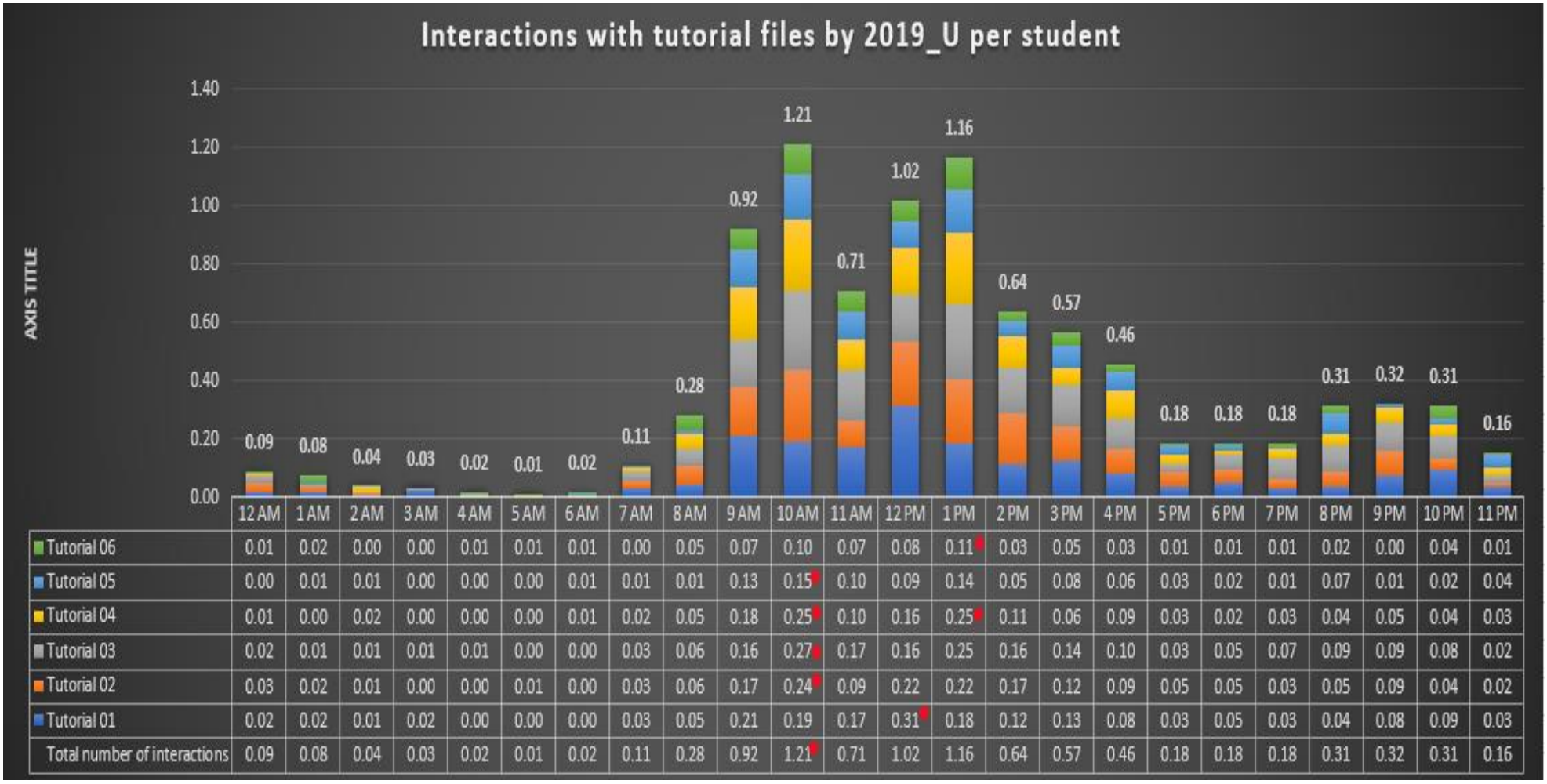
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Tutorial 06	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.08	0.08	0.03	0.05	0.05	0.11	0.03	0.08	0.05	0.08	0.05	0.00	0.05	0.03	0.03
Tutorial 05	0.00	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.05	0.08	0.05	0.08	0.05	0.05	0.11	0.00	0.18	0.11	0.13	0.16	0.08	0.00	0.00	0.03
Tutorial 04	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.05	0.08	0.05	0.13	0.13	0.08	0.16	0.11	0.26	0.13	0.34	0.08	0.11	0.05	0.05	0.08
Tutorial 03	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.00	0.05	0.03	0.05	0.24	0.16	0.05	0.13	0.13	0.16	0.34	0.13	0.03	0.13	0.11	0.08	0.00
Tutorial 02	0.03	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.03	0.05	0.13	0.00	0.16	0.05	0.03	0.05	0.18	0.08	0.18	0.08	0.08	0.08	0.08	0.03
Tutorial 01	0.00	0.03	0.00	0.00	0.00	0.05	0.00	0.00	0.03	0.11	0.16	0.21	0.13	0.13	0.16	0.16	0.21	0.08	0.11	0.16	0.29	0.13	0.21	0.08
Total number of interactions	0.08	0.03	0.03	0.00	0.00	0.13	0.11	0.05	0.24	0.42	0.53	0.68	0.68	0.42	0.68	0.47	1.08	0.79	0.97	0.55	0.68	0.42	0.45	0.24

Figure 9.3 4 Number of interactions for tutorial files by 2019_DE per student with time



	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Tutorial 06	0	0.02	0	0.02	0	0	0	0.02	0.02	0.04	0.06	0.06	0.06	0.24	0	0.04	0.06	0	0.06	0.04	0	0.06	0.04	0.02
Tutorial 05	0.02	0.02	0	0	0	0	0	0.06	0.02	0.12	0.18	0.26	0.1	0.14	0.06	0.08	0.06	0.08	0.12	0.04	0.02	0.08	0.02	0.04
Tutorial 04	0.04	0	0	0.02	0.04	0	0	0	0.1	0.08	0.14	0.32	0.16	0.32	0.12	0.08	0.04	0.06	0.08	0.08	0.06	0.16	0.08	0.1
Tutorial 03	0.02	0	0	0	0.04	0	0	0.04	0.02	0.14	0.14	0.34	0.16	0.28	0.16	0.04	0.04	0.08	0.1	0.04	0.04	0.14	0.1	0.12
Tutorial 02	0.04	0.02	0	0	0	0	0	0.04	0.04	0.1	0.1	0.32	0.1	0.28	0.14	0.1	0.02	0.08	0.04	0	0.06	0.06	0.12	0.04
Tutorial 01	0.02	0	0	0	0	0	0	0.02	0.08	0.1	0.18	0.26	0.32	0.24	0.18	0.04	0.1	0.02	0.02	0.1	0.04	0.1	0.12	0.04
Total number of interactions	0.14	0.06	0	0.04	0.08	0	0	0.18	0.28	0.58	0.8	1.56	0.9	1.5	0.66	0.38	0.32	0.32	0.42	0.3	0.22	0.6	0.48	0.36

Figure 9.3 5 Number of interactions for tutorial files by 2019_GE per student with time



	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Tutorial 06	0.01	0.02	0.00	0.00	0.01	0.01	0.01	0.00	0.05	0.07	0.10	0.07	0.08	0.11	0.03	0.05	0.03	0.01	0.01	0.01	0.02	0.00	0.04	0.01
Tutorial 05	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.13	0.15	0.10	0.09	0.14	0.05	0.08	0.06	0.03	0.02	0.01	0.07	0.01	0.02	0.04
Tutorial 04	0.01	0.00	0.02	0.00	0.00	0.00	0.01	0.02	0.05	0.18	0.25	0.10	0.16	0.25	0.11	0.06	0.09	0.03	0.02	0.03	0.04	0.05	0.04	0.03
Tutorial 03	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.03	0.06	0.16	0.27	0.17	0.16	0.25	0.16	0.14	0.10	0.03	0.05	0.07	0.09	0.09	0.08	0.02
Tutorial 02	0.03	0.02	0.01	0.00	0.00	0.01	0.00	0.03	0.06	0.17	0.24	0.09	0.22	0.22	0.17	0.12	0.09	0.05	0.05	0.03	0.05	0.09	0.04	0.02
Tutorial 01	0.02	0.02	0.01	0.02	0.00	0.00	0.00	0.03	0.05	0.21	0.19	0.17	0.31	0.18	0.12	0.13	0.08	0.03	0.05	0.03	0.04	0.08	0.09	0.03
Total number of interactions	0.09	0.08	0.04	0.03	0.02	0.01	0.02	0.11	0.28	0.92	1.21	0.71	1.02	1.16	0.64	0.57	0.46	0.18	0.18	0.18	0.31	0.32	0.31	0.16

Figure 9.3 6 Number of interactions for tutorial files by 2019_U per student with time

Groups	Total Number of students	FLO Overview	Conceptual Modelling	Database Architecture and Web	Database Environment	Database Software Development	Enhanced ER Modelling	ER Modelling Part I	ER Modelling Part II	Explanation of the SAM	HOWTO UniLife	Introduction to Database	Logical Modelling	Logical Modelling II	Normalization I	Normalization II	Relational Algebra - Part 01	Relational Algebra - Part 02	The Relational Model	Topic Introduction
2018_F2F	100	6.04	3.16	4.61	5.35	5.86	3.70	5.48	3.68	3.25	4.50	7.61	5.43	4.78	5.02	3.65	0.00	0.00	0.00	11.64
2018_DE	11	5.55	3.73	6.64	7.73	6.64	5.00	6.91	5.00	6.18	3.82	12.27	6.45	5.82	2.64	1.82	0.00	0.00	0.00	14.55
2019_DE	38	4.89	3.05	2.87	3.76	3.24	4.24	4.42	3.61	0.00	1.84	5.89	5.29	4.05	3.16	2.39	3.37	3.53	4.61	2.79
2019_GE	50	3.78	2.36	2.66	4.40	1.96	2.50	3.56	2.30	0.00	1.52	5.14	4.24	2.44	3.78	2.92	1.98	1.62	2.84	3.20
2019_U	173	2.82	1.70	2.62	2.62	2.36	2.10	2.91	1.74	0.00	0.95	4.52	2.38	1.84	2.84	2.07	2.22	1.83	3.34	1.45

Table 7 IPS with theoretical course material's videos throughout the semester

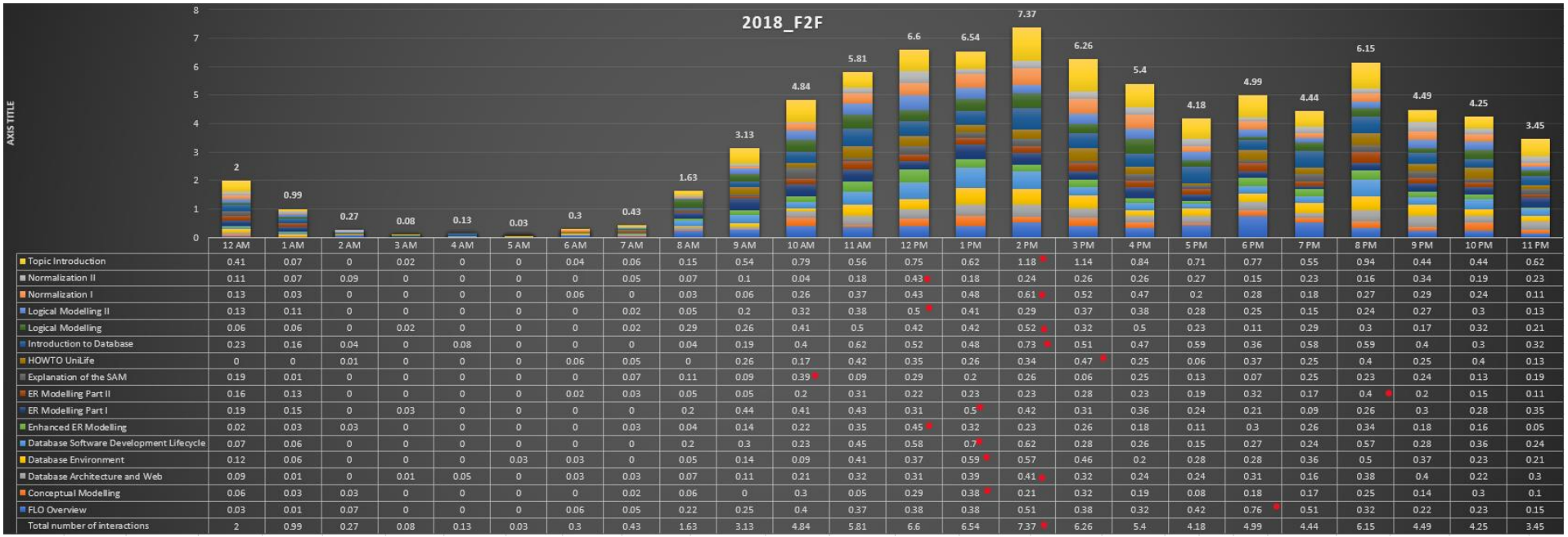
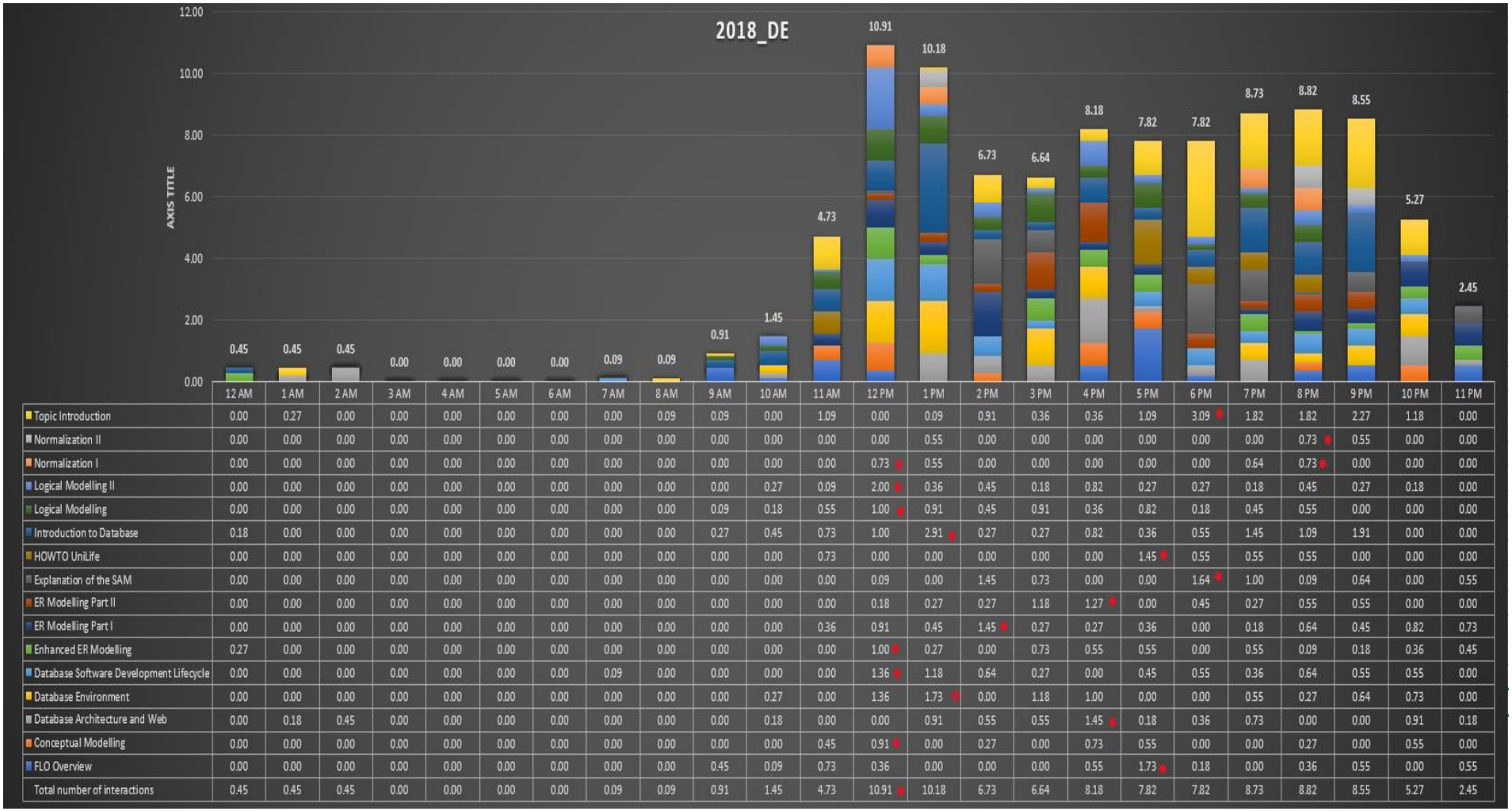
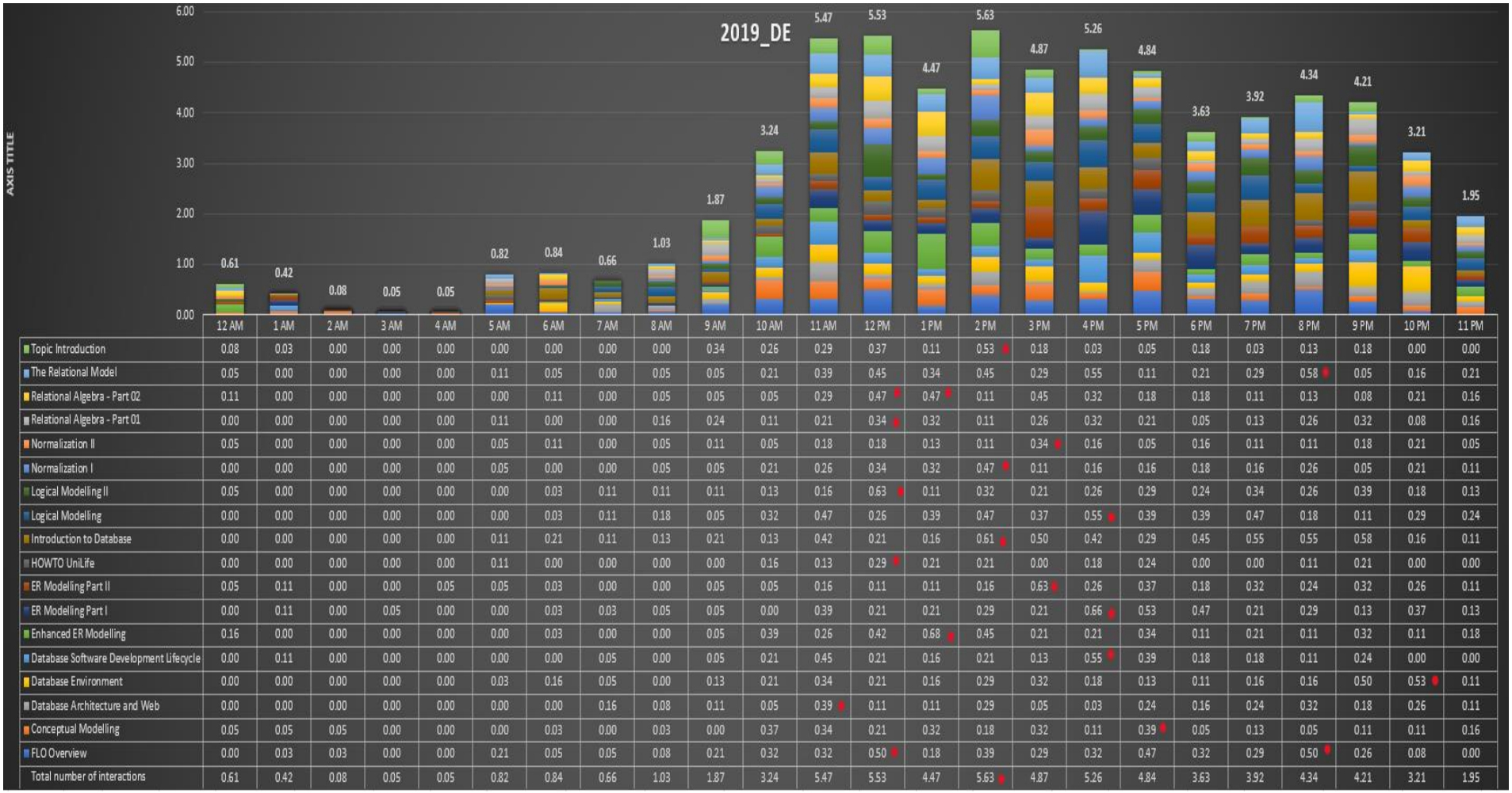


Figure 9.3 7 Interactions with theoretical course material's videos by 2018_F2F per student with time



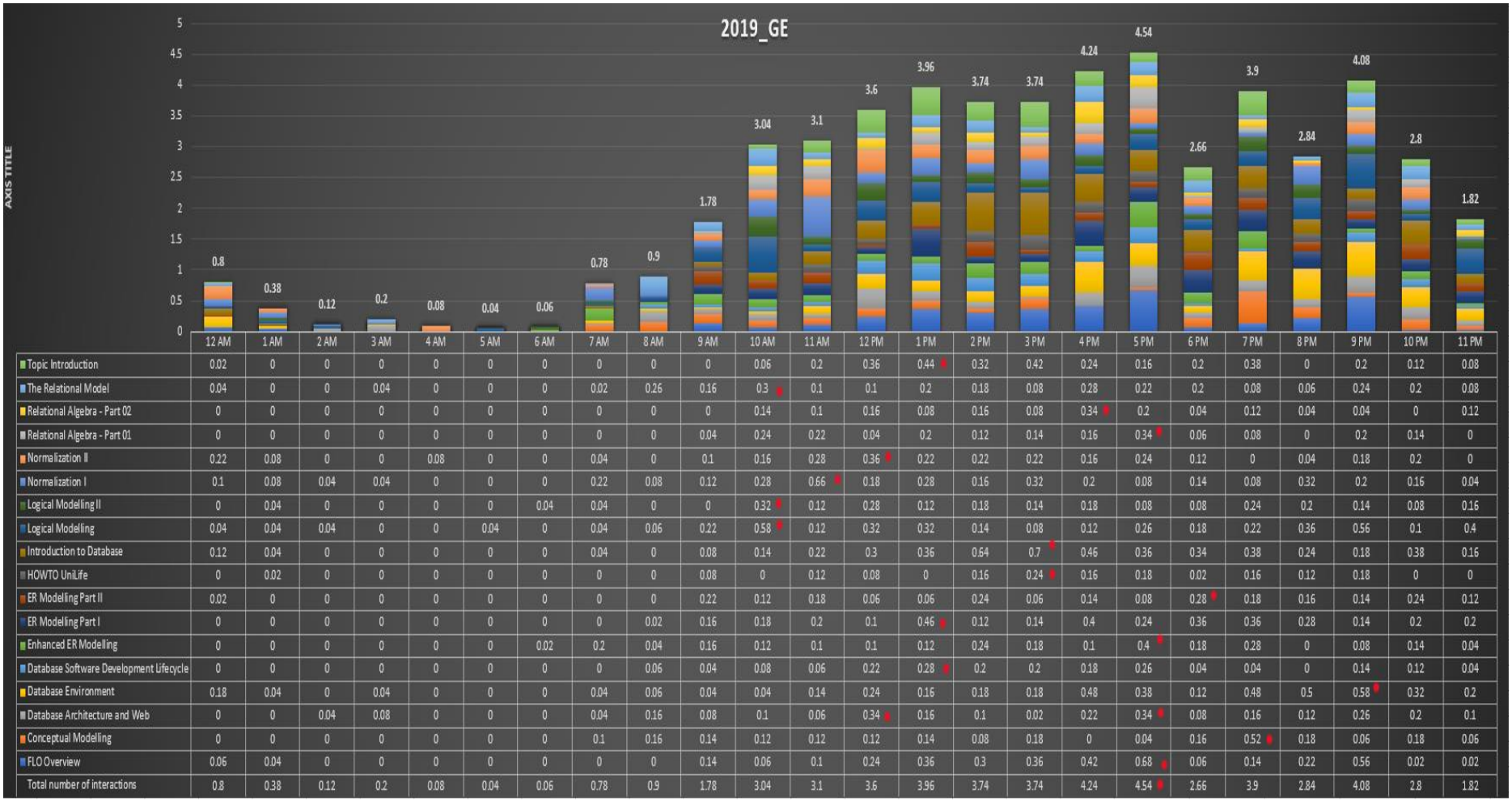
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Topic Introduction	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.00	1.09	0.00	0.09	0.91	0.36	0.36	1.09	3.09	1.82	1.82	2.27	1.18	0.00
Normalization II	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.55	0.00	0.00
Normalization I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.55	0.00	0.00	0.00	0.00	0.00	0.64	0.73	0.00	0.00	0.00
Logical Modelling II	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.09	2.00	0.36	0.45	0.18	0.82	0.27	0.27	0.18	0.45	0.27	0.18	0.00
Logical Modelling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.18	0.55	1.00	0.91	0.45	0.91	0.36	0.82	0.18	0.45	0.55	0.00	0.00	0.00
Introduction to Database	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.45	0.73	1.00	2.91	0.27	0.27	0.82	0.36	0.55	1.45	1.09	1.91	0.00	0.00
HOWTO UniLife	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.00	0.00	0.00	0.00	0.00	1.45	0.55	0.55	0.55	0.00	0.00	0.00
Explanation of the SAM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	1.45	0.73	0.00	0.00	1.64	1.00	0.09	0.64	0.00	0.55
ER Modelling Part II	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.27	0.27	1.18	1.27	0.00	0.45	0.27	0.55	0.55	0.00	0.00
ER Modelling Part I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.91	0.45	1.45	0.27	0.27	0.36	0.00	0.18	0.64	0.45	0.82	0.73
Enhanced ER Modelling	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.27	0.00	0.73	0.55	0.55	0.00	0.55	0.09	0.18	0.36	0.45
Database Software Development Lifecycle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	1.36	1.18	0.64	0.27	0.00	0.45	0.55	0.36	0.64	0.55	0.55	0.00
Database Environment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	1.36	1.73	0.00	1.18	1.00	0.00	0.00	0.55	0.27	0.64	0.73	0.00
Database Architecture and Web	0.00	0.18	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.91	0.55	0.55	1.45	0.18	0.36	0.73	0.00	0.00	0.91	0.18
Conceptual Modelling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.91	0.00	0.27	0.00	0.73	0.55	0.00	0.00	0.27	0.00	0.55	0.00
FLO Overview	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.09	0.73	0.36	0.00	0.00	0.00	0.55	1.73	0.18	0.00	0.36	0.55	0.00	0.55
Total number of interactions	0.45	0.45	0.45	0.00	0.00	0.00	0.00	0.09	0.09	0.91	1.45	4.73	10.91	10.18	6.73	6.64	8.18	7.82	7.82	8.73	8.82	8.55	5.27	2.45

Figure 9.3 8 Interactions with theoretical course material's videos by 2018_DE per student with time



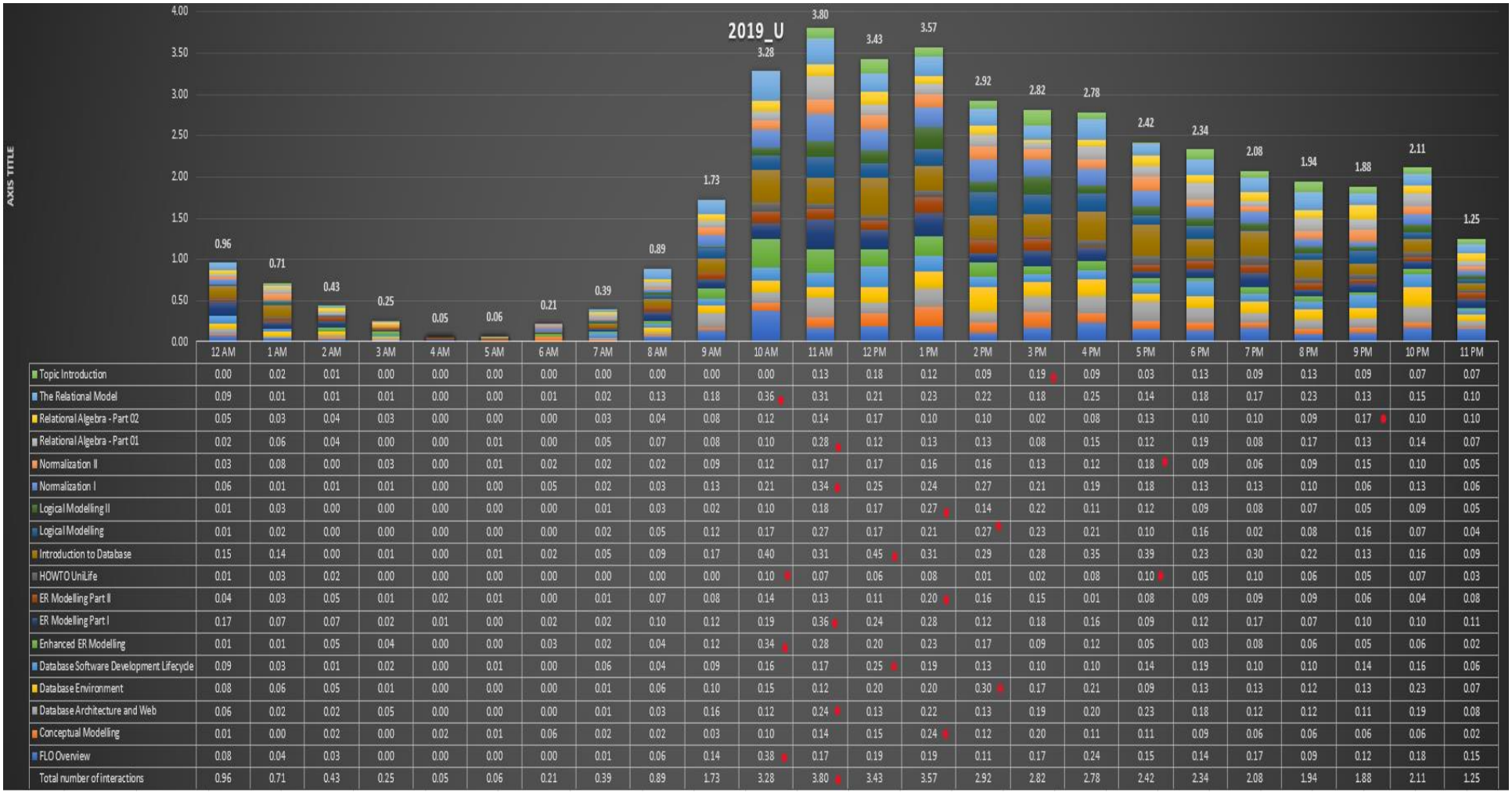
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Topic Introduction	0.08	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.26	0.29	0.37	0.11	0.53	0.18	0.03	0.05	0.18	0.03	0.13	0.18	0.00	0.00
The Relational Model	0.05	0.00	0.00	0.00	0.00	0.11	0.05	0.00	0.05	0.05	0.21	0.39	0.45	0.34	0.45	0.29	0.55	0.11	0.21	0.29	0.58	0.05	0.16	0.21
Relational Algebra - Part 02	0.11	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.05	0.05	0.05	0.29	0.47	0.47	0.11	0.45	0.32	0.18	0.18	0.11	0.13	0.08	0.21	0.16
Relational Algebra - Part 01	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.16	0.24	0.11	0.21	0.34	0.32	0.11	0.26	0.32	0.21	0.05	0.13	0.26	0.32	0.08	0.16
Normalization II	0.05	0.00	0.00	0.00	0.00	0.05	0.11	0.00	0.05	0.11	0.05	0.18	0.18	0.13	0.11	0.34	0.16	0.05	0.16	0.11	0.11	0.18	0.21	0.05
Normalization I	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.05	0.05	0.21	0.26	0.34	0.32	0.47	0.11	0.16	0.16	0.18	0.16	0.26	0.05	0.21	0.11
Logical Modelling II	0.05	0.00	0.00	0.00	0.00	0.00	0.03	0.11	0.11	0.11	0.13	0.16	0.63	0.11	0.32	0.21	0.26	0.29	0.24	0.34	0.26	0.39	0.18	0.13
Logical Modelling	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.11	0.18	0.05	0.32	0.47	0.26	0.39	0.47	0.37	0.55	0.39	0.39	0.47	0.18	0.11	0.29	0.24
Introduction to Database	0.00	0.00	0.00	0.00	0.00	0.11	0.21	0.11	0.13	0.21	0.13	0.42	0.21	0.16	0.61	0.50	0.42	0.29	0.45	0.55	0.55	0.58	0.16	0.11
HOWTO UniLife	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.16	0.13	0.29	0.21	0.21	0.00	0.18	0.24	0.00	0.00	0.11	0.21	0.00	0.00
ER Modelling Part II	0.05	0.11	0.00	0.00	0.05	0.05	0.03	0.00	0.00	0.05	0.05	0.16	0.11	0.11	0.16	0.63	0.26	0.37	0.18	0.32	0.24	0.32	0.26	0.11
ER Modelling Part I	0.00	0.11	0.00	0.05	0.00	0.00	0.03	0.03	0.05	0.05	0.00	0.39	0.21	0.21	0.29	0.21	0.66	0.53	0.47	0.21	0.29	0.13	0.37	0.13
Enhanced ER Modelling	0.16	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.05	0.39	0.26	0.42	0.68	0.45	0.21	0.21	0.34	0.11	0.21	0.11	0.32	0.11	0.18
Database Software Development Lifecycle	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.05	0.21	0.45	0.21	0.16	0.21	0.13	0.55	0.39	0.18	0.18	0.11	0.24	0.00	0.00
Database Environment	0.00	0.00	0.00	0.00	0.00	0.03	0.16	0.05	0.00	0.13	0.21	0.34	0.21	0.16	0.29	0.32	0.18	0.13	0.11	0.16	0.16	0.50	0.53	0.11
Database Architecture and Web	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.08	0.11	0.05	0.39	0.11	0.11	0.29	0.05	0.03	0.24	0.16	0.24	0.32	0.18	0.26	0.11
Conceptual Modelling	0.05	0.05	0.05	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.37	0.34	0.21	0.32	0.18	0.32	0.11	0.39	0.05	0.13	0.05	0.11	0.11	0.16
FLO Overview	0.00	0.03	0.03	0.00	0.00	0.21	0.05	0.05	0.08	0.21	0.32	0.32	0.50	0.18	0.39	0.29	0.32	0.47	0.32	0.29	0.50	0.26	0.08	0.00
Total number of interactions	0.61	0.42	0.08	0.05	0.05	0.82	0.84	0.66	1.03	1.87	3.24	5.47	5.53	4.47	5.63	4.87	5.26	4.84	3.63	3.92	4.34	4.21	3.21	1.95

Figure 9.3 9 Interactions with theoretical course material's videos by 2019_DE per student with time



	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Topic Introduction	0.02	0	0	0	0	0	0	0	0	0	0.06	0.2	0.36	0.44	0.32	0.42	0.24	0.16	0.2	0.38	0	0.2	0.12	0.08
The Relational Model	0.04	0	0	0.04	0	0	0	0.02	0.26	0.16	0.3	0.1	0.1	0.2	0.18	0.08	0.28	0.22	0.2	0.08	0.06	0.24	0.2	0.08
Relational Algebra - Part 02	0	0	0	0	0	0	0	0	0	0	0.14	0.1	0.16	0.08	0.16	0.08	0.34	0.2	0.04	0.12	0.04	0.04	0	0.12
Relational Algebra - Part 01	0	0	0	0	0	0	0	0	0	0.04	0.24	0.22	0.04	0.2	0.12	0.14	0.16	0.34	0.06	0.08	0	0.2	0.14	0
Normalization II	0.22	0.08	0	0	0.08	0	0	0.04	0	0.1	0.16	0.28	0.36	0.22	0.22	0.22	0.16	0.24	0.12	0	0.04	0.18	0.2	0
Normalization I	0.1	0.08	0.04	0.04	0	0	0	0.22	0.08	0.12	0.28	0.66	0.18	0.28	0.16	0.32	0.2	0.08	0.14	0.08	0.32	0.2	0.16	0.04
Logical Modelling II	0	0.04	0	0	0	0	0.04	0.04	0	0	0.32	0.12	0.28	0.12	0.18	0.14	0.18	0.08	0.08	0.24	0.2	0.14	0.08	0.16
Logical Modelling	0.04	0.04	0.04	0	0	0.04	0	0.04	0.06	0.22	0.58	0.12	0.32	0.32	0.14	0.08	0.12	0.26	0.18	0.22	0.36	0.56	0.1	0.4
Introduction to Database	0.12	0.04	0	0	0	0	0	0.04	0	0.08	0.14	0.22	0.3	0.36	0.64	0.7	0.46	0.36	0.34	0.38	0.24	0.18	0.38	0.16
HOWTO UniLife	0	0.02	0	0	0	0	0	0	0	0.08	0	0.12	0.08	0	0.16	0.24	0.16	0.18	0.02	0.16	0.12	0.18	0	0
ER Modelling Part II	0.02	0	0	0	0	0	0	0	0	0.22	0.12	0.18	0.06	0.06	0.24	0.06	0.14	0.08	0.28	0.18	0.16	0.14	0.24	0.12
ER Modelling Part I	0	0	0	0	0	0	0	0	0.02	0.16	0.18	0.2	0.1	0.46	0.12	0.14	0.4	0.24	0.36	0.36	0.28	0.14	0.2	0.2
Enhanced ER Modelling	0	0	0	0	0	0	0.02	0.2	0.04	0.16	0.12	0.1	0.1	0.12	0.24	0.18	0.1	0.4	0.18	0.28	0	0.08	0.14	0.04
Database Software Development Lifecycle	0	0	0	0	0	0	0	0	0.06	0.04	0.08	0.06	0.22	0.28	0.2	0.2	0.18	0.26	0.04	0.04	0	0.14	0.12	0.04
Database Environment	0.18	0.04	0	0.04	0	0	0	0.04	0.06	0.04	0.04	0.14	0.24	0.16	0.18	0.18	0.48	0.38	0.12	0.48	0.5	0.58	0.32	0.2
Database Architecture and Web	0	0	0.04	0.08	0	0	0	0.04	0.16	0.08	0.1	0.06	0.34	0.16	0.1	0.02	0.22	0.34	0.08	0.16	0.12	0.26	0.2	0.1
Conceptual Modelling	0	0	0	0	0	0	0	0.1	0.16	0.14	0.12	0.12	0.12	0.14	0.08	0.18	0	0.04	0.16	0.52	0.18	0.06	0.18	0.06
FLO Overview	0.06	0.04	0	0	0	0	0	0	0	0.14	0.06	0.1	0.24	0.36	0.3	0.36	0.42	0.68	0.06	0.14	0.22	0.56	0.02	0.02
Total number of interactions	0.8	0.38	0.12	0.2	0.08	0.04	0.06	0.78	0.9	1.78	3.04	3.1	3.6	3.96	3.74	3.74	4.24	4.54	2.66	3.9	2.84	4.08	2.8	1.82

Figure 9.3 10 Interactions with theoretical course material's videos by 2019_GE per student with time

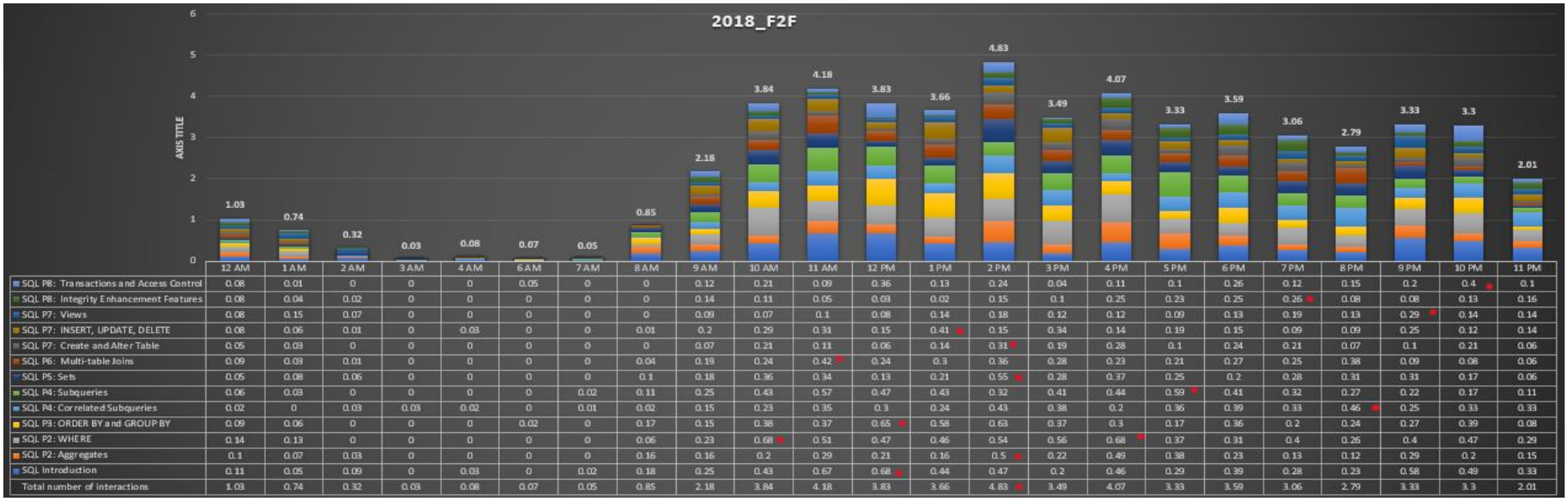


	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Topic Introduction	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.18	0.12	0.09	0.19	0.09	0.03	0.13	0.09	0.13	0.09	0.07	0.07
The Relational Model	0.09	0.01	0.01	0.01	0.00	0.00	0.01	0.02	0.13	0.18	0.36	0.31	0.21	0.23	0.22	0.18	0.25	0.14	0.18	0.17	0.23	0.13	0.15	0.10
Relational Algebra - Part 02	0.05	0.03	0.04	0.03	0.00	0.00	0.00	0.03	0.04	0.08	0.12	0.14	0.17	0.10	0.10	0.02	0.08	0.13	0.10	0.10	0.09	0.17	0.10	0.10
Relational Algebra - Part 01	0.02	0.06	0.04	0.00	0.00	0.01	0.00	0.05	0.07	0.08	0.10	0.28	0.12	0.13	0.13	0.08	0.15	0.12	0.19	0.08	0.17	0.13	0.14	0.07
Normalization II	0.03	0.08	0.00	0.03	0.00	0.01	0.02	0.02	0.02	0.09	0.12	0.17	0.17	0.16	0.16	0.13	0.12	0.18	0.09	0.06	0.09	0.15	0.10	0.05
Normalization I	0.06	0.01	0.01	0.01	0.00	0.00	0.05	0.02	0.03	0.13	0.21	0.34	0.25	0.24	0.27	0.21	0.19	0.18	0.13	0.13	0.10	0.06	0.13	0.06
Logical Modelling II	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.02	0.10	0.18	0.17	0.27	0.14	0.22	0.11	0.12	0.09	0.08	0.07	0.05	0.09	0.05
Logical Modelling	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.05	0.12	0.17	0.27	0.17	0.21	0.27	0.23	0.21	0.10	0.16	0.02	0.08	0.16	0.07	0.04
Introduction to Database	0.15	0.14	0.00	0.01	0.00	0.01	0.02	0.05	0.09	0.17	0.40	0.31	0.45	0.31	0.29	0.28	0.35	0.39	0.23	0.30	0.22	0.13	0.16	0.09
HOWTO UniLife	0.01	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.07	0.06	0.08	0.01	0.02	0.08	0.10	0.05	0.10	0.06	0.05	0.07	0.03
ER Modelling Part II	0.04	0.03	0.05	0.01	0.02	0.01	0.00	0.01	0.07	0.08	0.14	0.13	0.11	0.20	0.16	0.15	0.01	0.08	0.09	0.09	0.09	0.06	0.04	0.08
ER Modelling Part I	0.17	0.07	0.07	0.02	0.01	0.00	0.02	0.02	0.10	0.12	0.19	0.36	0.24	0.28	0.12	0.18	0.16	0.09	0.12	0.17	0.07	0.10	0.10	0.11
Enhanced ER Modelling	0.01	0.01	0.05	0.04	0.00	0.00	0.03	0.02	0.04	0.12	0.34	0.28	0.20	0.23	0.17	0.09	0.12	0.05	0.03	0.08	0.06	0.05	0.06	0.02
Database Software Development Lifecycle	0.09	0.03	0.01	0.02	0.00	0.01	0.00	0.06	0.04	0.09	0.16	0.17	0.25	0.19	0.13	0.10	0.10	0.14	0.19	0.10	0.10	0.14	0.16	0.06
Database Environment	0.08	0.06	0.05	0.01	0.00	0.00	0.00	0.01	0.06	0.10	0.15	0.12	0.20	0.20	0.30	0.17	0.21	0.09	0.13	0.13	0.12	0.13	0.23	0.07
Database Architecture and Web	0.06	0.02	0.02	0.05	0.00	0.00	0.00	0.01	0.03	0.16	0.12	0.24	0.13	0.22	0.13	0.19	0.20	0.23	0.18	0.12	0.12	0.11	0.19	0.08
Conceptual Modelling	0.01	0.00	0.02	0.00	0.02	0.01	0.06	0.02	0.02	0.03	0.10	0.14	0.15	0.24	0.12	0.20	0.11	0.11	0.09	0.06	0.06	0.06	0.06	0.02
FLO Overview	0.08	0.04	0.03	0.00	0.00	0.00	0.00	0.01	0.06	0.14	0.38	0.17	0.19	0.19	0.11	0.17	0.24	0.15	0.14	0.17	0.09	0.12	0.18	0.15
Total number of interactions	0.96	0.71	0.43	0.25	0.05	0.06	0.21	0.39	0.89	1.73	3.28	3.80	3.43	3.57	2.92	2.82	2.78	2.42	2.34	2.08	1.94	1.88	2.11	1.25

Figure 9.3 11 Interactions with theoretical course material's videos by 2019_U per student with time

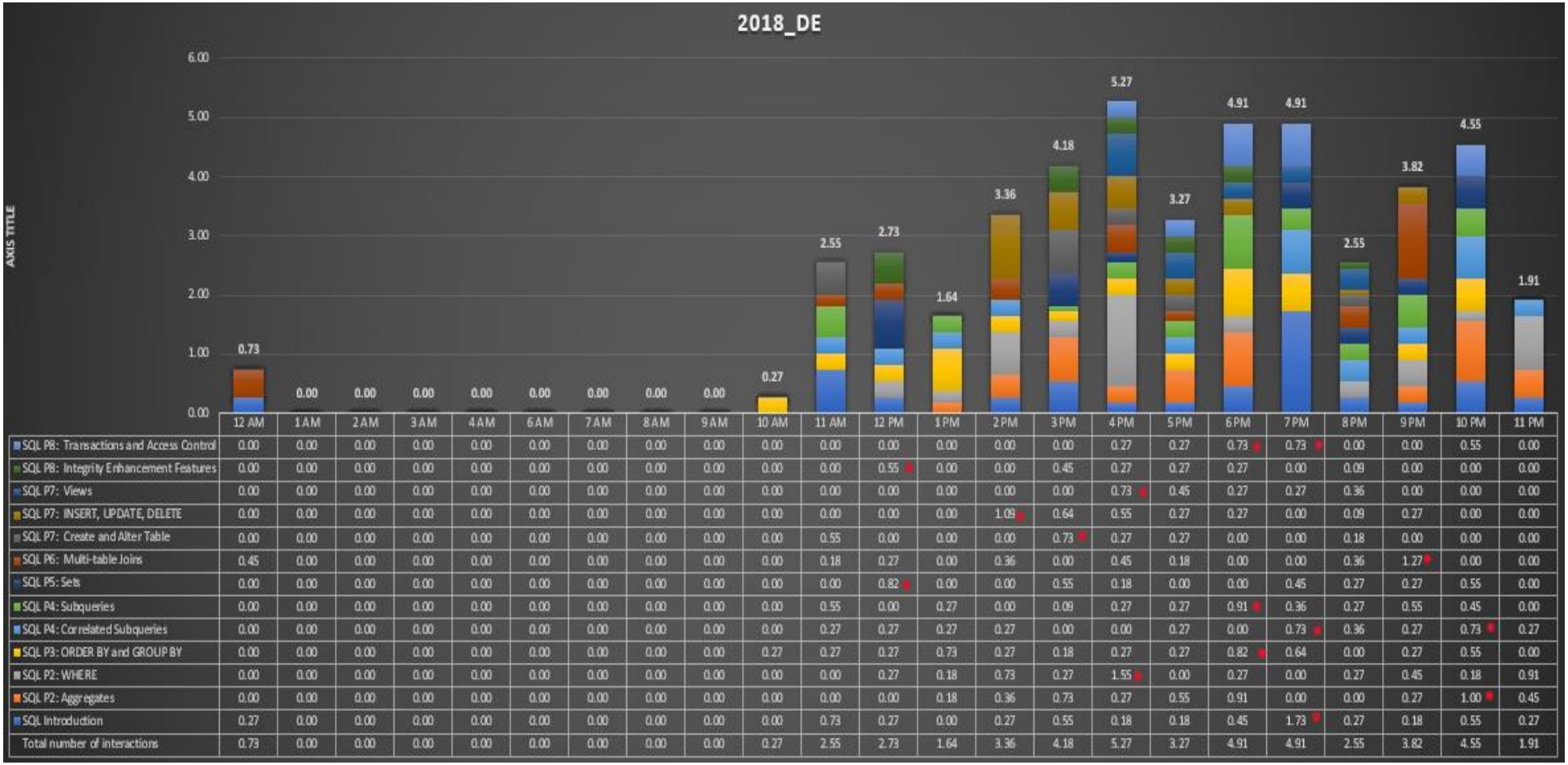
Groups	Total Number of students	SQL Introduction	SQL P2: Aggregates	SQL P2: WHERE	SQL P3: ORDER BY and GROUP BY	SQL P4: Correlated Subqueries	SQL P4: Subqueries	SQL P5: Sets	SQL P6: Multi-table Joins	SQL P7: Create and Alter Table	SQL P7: INSERT, UPDATE, DELETE	SQL P7: Views	SQL P8: Integrity Enhancement Features	SQL P8: Transactions and Access Control
2018_F2F	100	6.67	4.09	6.96	5.48	4.86	5.63	4.29	3.77	2.44	3.21	2.31	2.18	2.77
2018_DE	11	5.91	4.73	5.09	4.82	3.73	4.00	3.09	3.55	2.00	3.18	2.09	1.91	2.55
2019_DE	38	4.76	2.21	3.74	3.74	4.24	4.74	3.00	3.32	2.26	3.53	2.08	1.79	1.76
2019_GE	50	3.00	1.98	3.74	3.46	3.10	2.84	2.54	2.18	1.50	2.42	1.16	0.88	1.40
2019_U	173	2.14	1.59	2.66	1.94	1.73	2.17	2.10	1.57	1.21	1.38	1.09	0.72	1.03

Table 8 IPS with practical course material videos throughout the semester



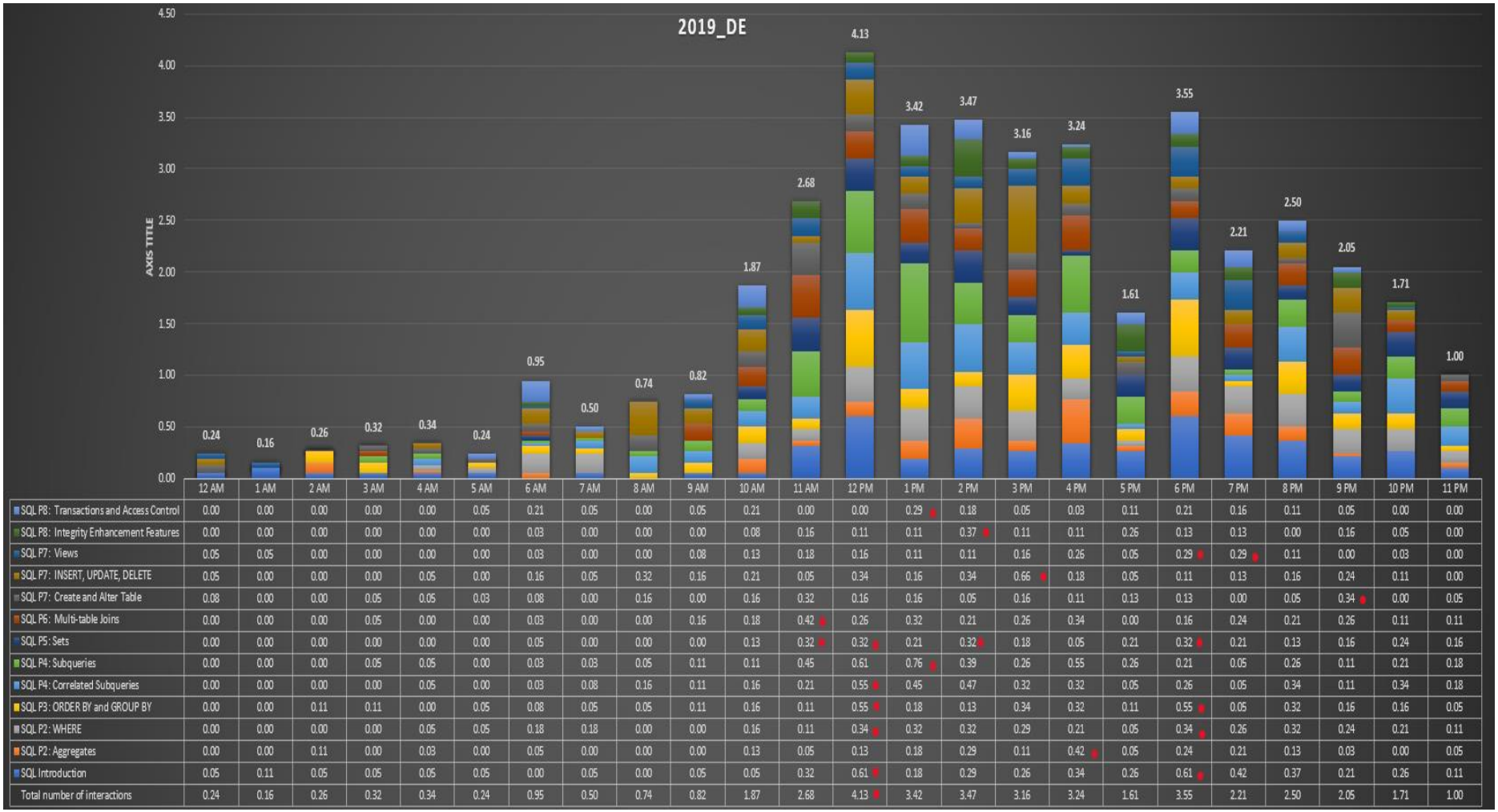
	12 AM	1 AM	2 AM	3 AM	4 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
SQL P8: Transactions and Access Control	0.08	0.01	0	0	0	0.05	0	0	0.12	0.21	0.09	0.36	0.13	0.24	0.04	0.11	0.1	0.26	0.12	0.15	0.2	0.4	0.1
SQL P8: Integrity Enhancement Features	0.08	0.04	0.02	0	0	0	0	0	0.14	0.11	0.05	0.03	0.02	0.15	0.1	0.25	0.23	0.25	0.26	0.08	0.08	0.13	0.16
SQL P7: Views	0.08	0.15	0.07	0	0	0	0	0	0.09	0.07	0.1	0.08	0.14	0.18	0.12	0.12	0.09	0.13	0.19	0.13	0.29	0.14	0.14
SQL P7: INSERT, UPDATE, DELETE	0.08	0.06	0.01	0	0.03	0	0	0.01	0.2	0.29	0.31	0.15	0.41	0.15	0.34	0.14	0.19	0.15	0.09	0.09	0.25	0.12	0.14
SQL P7: Create and Alter Table	0.05	0.03	0	0	0	0	0	0	0.07	0.21	0.11	0.06	0.14	0.31	0.19	0.28	0.1	0.24	0.21	0.07	0.1	0.21	0.06
SQL P6: Multi-table Joins	0.09	0.03	0.01	0	0	0	0	0.04	0.19	0.24	0.42	0.24	0.3	0.36	0.28	0.23	0.21	0.27	0.25	0.38	0.09	0.08	0.06
SQL P5: Sets	0.05	0.08	0.06	0	0	0	0	0.1	0.18	0.36	0.34	0.13	0.21	0.55	0.28	0.37	0.25	0.2	0.28	0.31	0.31	0.17	0.06
SQL P4: Subqueries	0.06	0.03	0	0	0	0	0.02	0.11	0.25	0.43	0.57	0.47	0.43	0.32	0.41	0.44	0.59	0.41	0.32	0.27	0.22	0.17	0.11
SQL P4: Correlated Subqueries	0.02	0	0.03	0.03	0.02	0	0.01	0.02	0.15	0.23	0.35	0.3	0.24	0.43	0.38	0.2	0.36	0.39	0.33	0.46	0.25	0.33	0.33
SQL P3: ORDER BY and GROUP BY	0.09	0.06	0	0	0	0.02	0	0.17	0.15	0.38	0.37	0.65	0.58	0.63	0.37	0.3	0.17	0.36	0.2	0.24	0.27	0.39	0.08
SQL P2: WHERE	0.14	0.13	0	0	0	0	0	0.06	0.23	0.68	0.51	0.47	0.46	0.54	0.56	0.68	0.37	0.31	0.4	0.26	0.4	0.47	0.29
SQL P2: Aggregates	0.1	0.07	0.03	0	0	0	0	0.16	0.16	0.2	0.29	0.21	0.16	0.5	0.22	0.49	0.38	0.23	0.13	0.12	0.29	0.2	0.15
SQL Introduction	0.11	0.05	0.09	0	0.03	0	0.02	0.18	0.25	0.43	0.67	0.68	0.44	0.47	0.2	0.46	0.29	0.39	0.28	0.23	0.58	0.49	0.33
Total number of interactions	1.03	0.74	0.32	0.03	0.08	0.07	0.05	0.85	2.18	3.84	4.18	3.83	3.66	4.83	3.49	4.07	3.33	3.59	3.06	2.79	3.33	3.3	2.01

Figure 9.3 12 Interactions with practical course material's videos by 2018_F2F per student with time



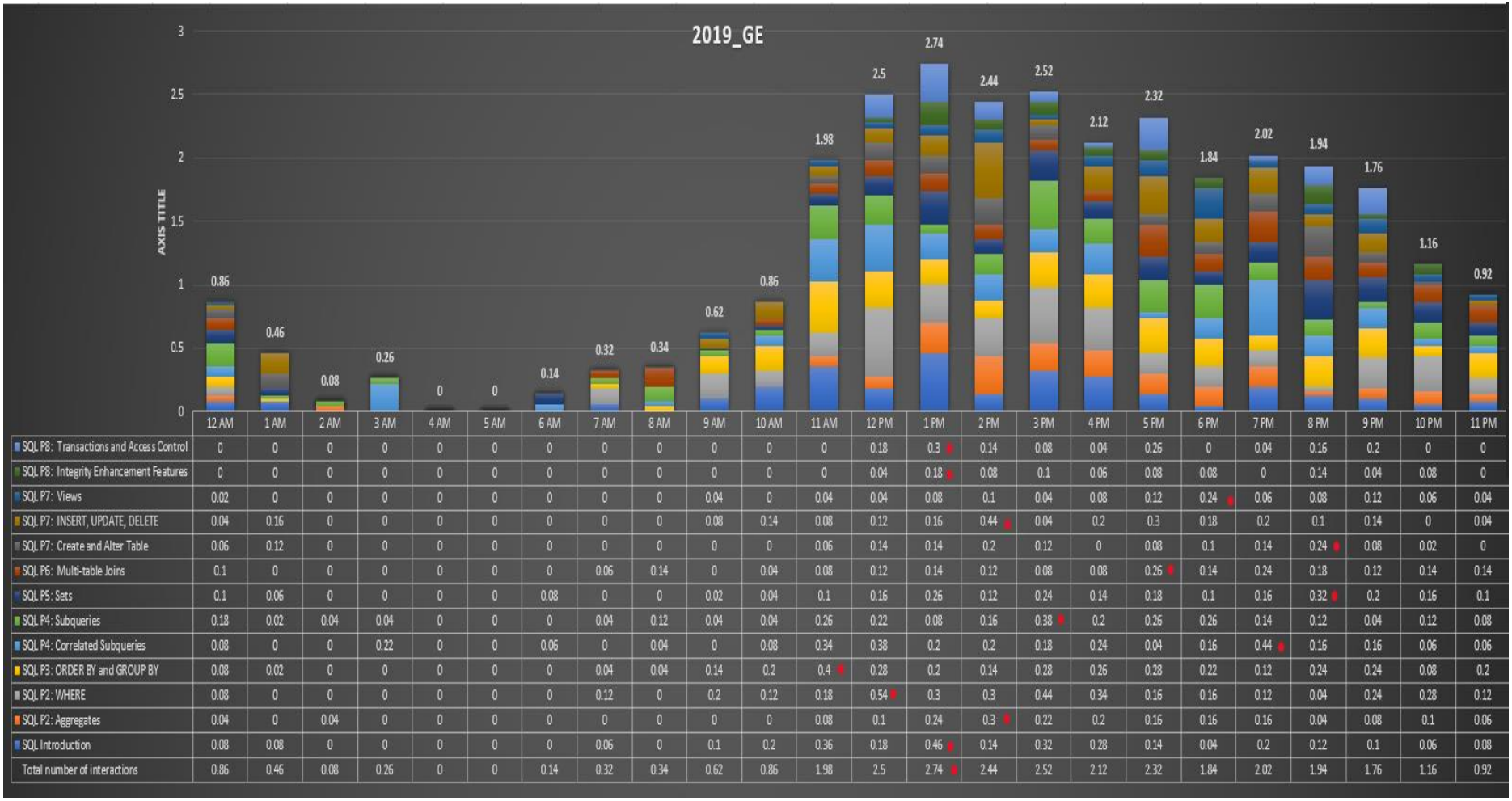
	12 AM	1 AM	2 AM	3 AM	4 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
SQL P8: Transactions and Access Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.27	0.73	0.73	0.00	0.00	0.55	0.00
SQL P8: Integrity Enhancement Features	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.00	0.45	0.27	0.27	0.27	0.00	0.09	0.00	0.00	0.00
SQL P7: Views	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.45	0.27	0.27	0.36	0.00	0.00	0.00
SQL P7: INSERT, UPDATE, DELETE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.09	0.64	0.55	0.27	0.27	0.00	0.09	0.27	0.00	0.00
SQL P7: Create and Alter Table	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.00	0.00	0.73	0.27	0.27	0.00	0.00	0.18	0.00	0.00	0.00
SQL P6: Multi-table Joins	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.27	0.00	0.36	0.00	0.45	0.18	0.00	0.00	0.36	1.27	0.00	0.00
SQL P5: Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82	0.00	0.00	0.55	0.18	0.00	0.00	0.45	0.27	0.27	0.55	0.00
SQL P4: Subqueries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.27	0.00	0.09	0.27	0.27	0.91	0.36	0.27	0.55	0.45	0.00
SQL P4: Correlated Subqueries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.27	0.27	0.27	0.00	0.00	0.27	0.00	0.73	0.36	0.27	0.73	0.27
SQL P3: ORDER BY and GROUP BY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.27	0.27	0.73	0.27	0.18	0.27	0.27	0.82	0.64	0.00	0.27	0.55	0.00
SQL P2: WHERE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.18	0.73	0.27	1.55	0.00	0.27	0.00	0.27	0.45	0.18	0.91
SQL P2: Aggregates	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.36	0.73	0.27	0.55	0.91	0.00	0.00	0.27	1.00	0.45
SQL Introduction	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.27	0.00	0.27	0.55	0.18	0.18	0.45	1.73	0.27	0.18	0.55	0.27
Total number of interactions	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	2.55	2.73	1.64	3.36	4.18	5.27	3.27	4.91	4.91	2.55	3.82	4.55	1.91

Figure 9.3 13 Interactions with practical course material's videos by 2018_DE per student with time



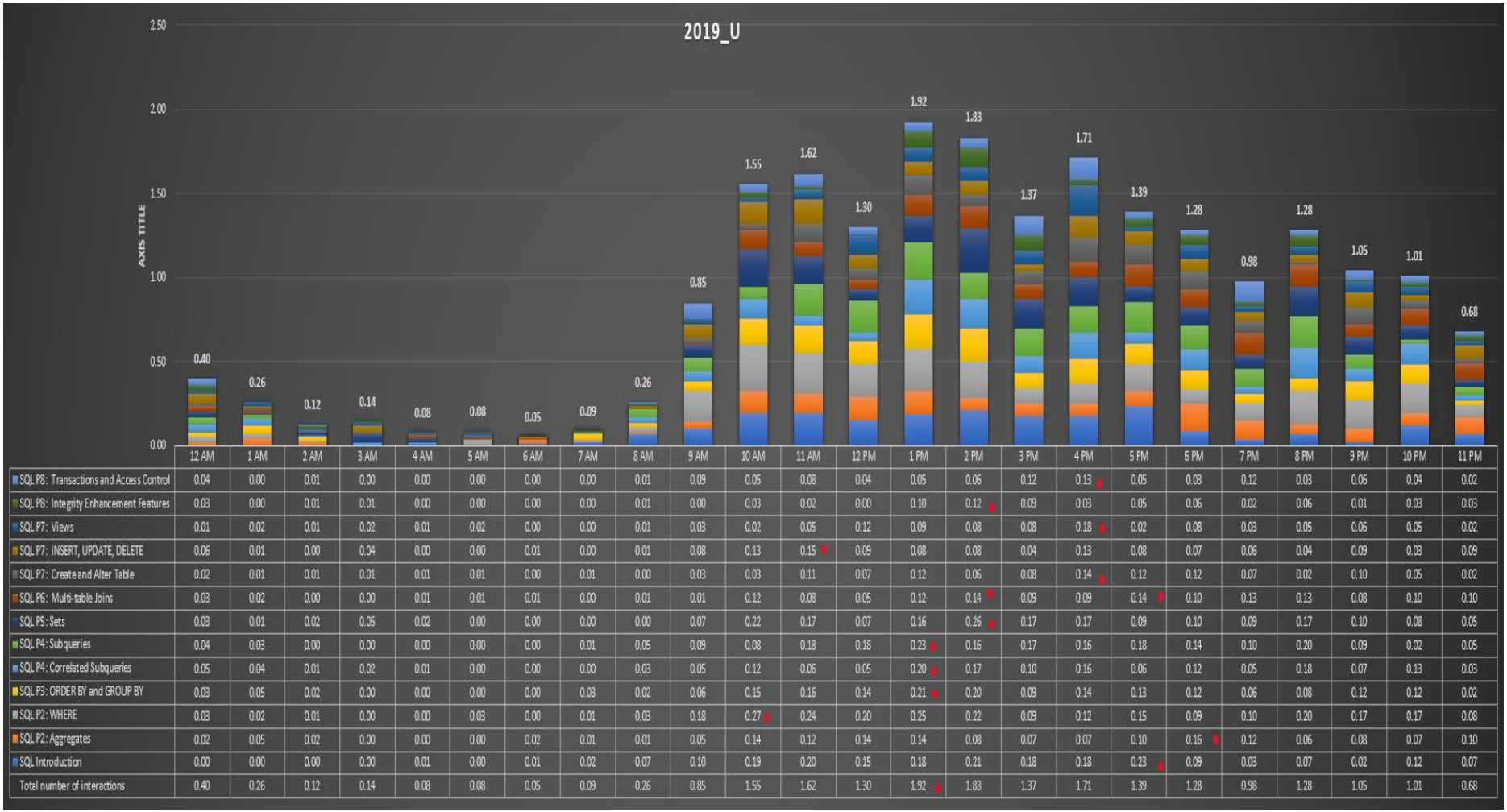
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
SQL P8: Transactions and Access Control	0.00	0.00	0.00	0.00	0.00	0.05	0.21	0.05	0.00	0.05	0.21	0.00	0.00	0.29	0.18	0.05	0.03	0.11	0.21	0.16	0.11	0.05	0.00	0.00
SQL P8: Integrity Enhancement Features	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.08	0.16	0.11	0.11	0.37	0.11	0.11	0.26	0.13	0.13	0.00	0.16	0.05	0.00
SQL P7: Views	0.05	0.05	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.08	0.13	0.18	0.16	0.11	0.11	0.16	0.26	0.05	0.29	0.29	0.11	0.00	0.03	0.00
SQL P7: INSERT, UPDATE, DELETE	0.05	0.00	0.00	0.00	0.05	0.00	0.16	0.05	0.32	0.16	0.21	0.05	0.34	0.16	0.34	0.66	0.18	0.05	0.11	0.13	0.16	0.24	0.11	0.00
SQL P7: Create and Alter Table	0.08	0.00	0.00	0.05	0.05	0.03	0.08	0.00	0.16	0.00	0.16	0.32	0.16	0.16	0.05	0.16	0.11	0.13	0.13	0.00	0.05	0.34	0.00	0.05
SQL P6: Multi-table Joins	0.00	0.00	0.00	0.05	0.00	0.00	0.03	0.00	0.00	0.16	0.18	0.42	0.26	0.32	0.21	0.26	0.34	0.00	0.16	0.24	0.21	0.26	0.11	0.11
SQL P5: Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.13	0.32	0.32	0.21	0.32	0.18	0.05	0.21	0.32	0.21	0.13	0.16	0.24	0.16
SQL P4: Subqueries	0.00	0.00	0.00	0.05	0.05	0.00	0.03	0.03	0.05	0.11	0.11	0.45	0.61	0.76	0.39	0.26	0.55	0.26	0.21	0.05	0.26	0.11	0.21	0.18
SQL P4: Correlated Subqueries	0.00	0.00	0.00	0.00	0.05	0.00	0.03	0.08	0.16	0.11	0.16	0.21	0.55	0.45	0.47	0.32	0.32	0.05	0.26	0.05	0.34	0.11	0.34	0.18
SQL P3: ORDER BY and GROUP BY	0.00	0.00	0.11	0.11	0.00	0.05	0.08	0.05	0.05	0.11	0.16	0.11	0.55	0.18	0.13	0.34	0.32	0.11	0.55	0.05	0.32	0.16	0.16	0.05
SQL P2: WHERE	0.00	0.00	0.00	0.00	0.05	0.05	0.18	0.18	0.00	0.00	0.16	0.11	0.34	0.32	0.32	0.29	0.21	0.05	0.34	0.26	0.32	0.24	0.21	0.11
SQL P2: Aggregates	0.00	0.00	0.11	0.00	0.03	0.00	0.05	0.00	0.00	0.00	0.13	0.05	0.13	0.18	0.29	0.11	0.42	0.05	0.24	0.21	0.13	0.03	0.00	0.05
SQL Introduction	0.05	0.11	0.05	0.05	0.05	0.05	0.00	0.05	0.00	0.05	0.05	0.32	0.61	0.18	0.29	0.26	0.34	0.26	0.61	0.42	0.37	0.21	0.26	0.11
Total number of interactions	0.24	0.16	0.26	0.32	0.34	0.24	0.95	0.50	0.74	0.82	1.87	2.68	4.13	3.42	3.47	3.16	3.24	1.61	3.55	2.21	2.50	2.05	1.71	1.00

Figure 9.3 14 Interactions with practical course material's videos by 2019_DE per student with time



	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
SQL P8: Transactions and Access Control	0	0	0	0	0	0	0	0	0	0	0	0	0.18	0.3	0.14	0.08	0.04	0.26	0	0.04	0.16	0.2	0	0
SQL P8: Integrity Enhancement Features	0	0	0	0	0	0	0	0	0	0	0	0	0.04	0.18	0.08	0.1	0.06	0.08	0.08	0	0.14	0.04	0.08	0
SQL P7: Views	0.02	0	0	0	0	0	0	0	0	0.04	0	0.04	0.04	0.08	0.1	0.04	0.08	0.12	0.24	0.06	0.08	0.12	0.06	0.04
SQL P7: INSERT, UPDATE, DELETE	0.04	0.16	0	0	0	0	0	0	0	0.08	0.14	0.08	0.12	0.16	0.44	0.04	0.2	0.3	0.18	0.2	0.1	0.14	0	0.04
SQL P7: Create and Alter Table	0.06	0.12	0	0	0	0	0	0	0	0	0	0.06	0.14	0.14	0.2	0.12	0	0.08	0.1	0.14	0.24	0.08	0.02	0
SQL P6: Multi-table Joins	0.1	0	0	0	0	0	0	0.06	0.14	0	0.04	0.08	0.12	0.14	0.12	0.08	0.08	0.26	0.14	0.24	0.18	0.12	0.14	0.14
SQL P5: Sets	0.1	0.06	0	0	0	0	0.08	0	0	0.02	0.04	0.1	0.16	0.26	0.12	0.24	0.14	0.18	0.1	0.16	0.32	0.2	0.16	0.1
SQL P4: Subqueries	0.18	0.02	0.04	0.04	0	0	0	0.04	0.12	0.04	0.04	0.26	0.22	0.08	0.16	0.38	0.2	0.26	0.26	0.14	0.12	0.04	0.12	0.08
SQL P4: Correlated Subqueries	0.08	0	0	0.22	0	0	0.06	0	0.04	0	0.08	0.34	0.38	0.2	0.2	0.18	0.24	0.04	0.16	0.44	0.16	0.16	0.06	0.06
SQL P3: ORDER BY and GROUP BY	0.08	0.02	0	0	0	0	0	0.04	0.04	0.14	0.2	0.4	0.28	0.2	0.14	0.28	0.26	0.28	0.22	0.12	0.24	0.24	0.08	0.2
SQL P2: WHERE	0.08	0	0	0	0	0	0	0.12	0	0.2	0.12	0.18	0.54	0.3	0.3	0.44	0.34	0.16	0.16	0.12	0.04	0.24	0.28	0.12
SQL P2: Aggregates	0.04	0	0.04	0	0	0	0	0	0	0	0	0.08	0.1	0.24	0.3	0.22	0.2	0.16	0.16	0.16	0.04	0.08	0.1	0.06
SQL Introduction	0.08	0.08	0	0	0	0	0	0.06	0	0.1	0.2	0.36	0.18	0.46	0.14	0.32	0.28	0.14	0.04	0.2	0.12	0.1	0.06	0.08
Total number of interactions	0.86	0.46	0.08	0.26	0	0	0.14	0.32	0.34	0.62	0.86	1.98	2.5	2.74	2.44	2.52	2.12	2.32	1.84	2.02	1.94	1.76	1.16	0.92

Figure 9.3 15 Interactions with practical course material's videos by 2019_GE per student with time

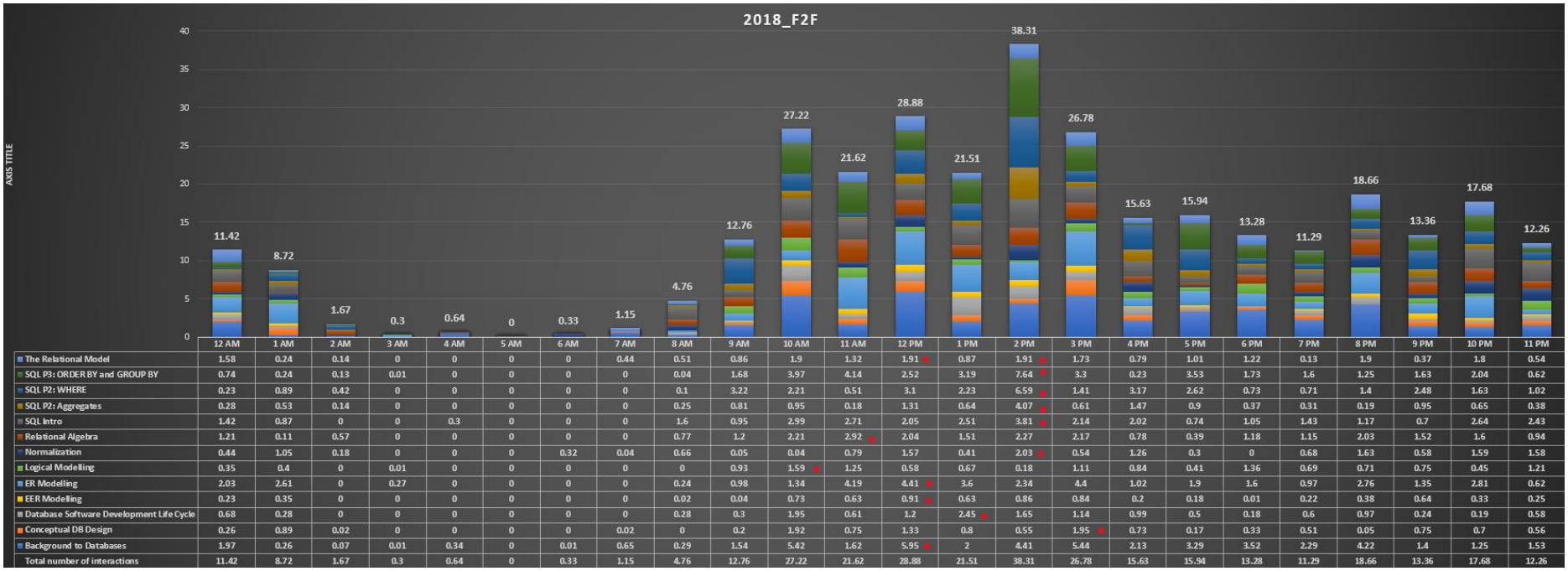


	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
SQL P8: Transactions and Access Control	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.09	0.05	0.08	0.04	0.05	0.06	0.12	0.13	0.05	0.03	0.12	0.03	0.06	0.04	0.02
SQL P8: Integrity Enhancement Features	0.03	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.02	0.00	0.10	0.12	0.09	0.03	0.05	0.06	0.02	0.06	0.01	0.03	0.03
SQL P7: Views	0.01	0.02	0.01	0.02	0.01	0.02	0.00	0.00	0.01	0.03	0.02	0.05	0.12	0.09	0.08	0.08	0.18	0.02	0.08	0.03	0.05	0.06	0.05	0.02
SQL P7: INSERT, UPDATE, DELETE	0.06	0.01	0.00	0.04	0.00	0.00	0.01	0.00	0.01	0.08	0.13	0.15	0.09	0.08	0.08	0.04	0.13	0.08	0.07	0.06	0.04	0.09	0.03	0.09
SQL P7: Create and Alter Table	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.03	0.03	0.11	0.07	0.12	0.06	0.08	0.14	0.12	0.12	0.07	0.02	0.10	0.05	0.02
SQL P6: Multi-table Joins	0.03	0.02	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.12	0.08	0.05	0.12	0.14	0.09	0.09	0.14	0.10	0.13	0.13	0.08	0.10	0.10
SQL P5: Sets	0.03	0.01	0.02	0.05	0.02	0.00	0.00	0.00	0.00	0.07	0.22	0.17	0.07	0.16	0.26	0.17	0.17	0.09	0.10	0.09	0.17	0.10	0.08	0.05
SQL P4: Subqueries	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.05	0.09	0.08	0.18	0.18	0.23	0.16	0.17	0.16	0.18	0.14	0.10	0.20	0.09	0.02	0.05
SQL P4: Correlated Subqueries	0.05	0.04	0.01	0.02	0.01	0.00	0.00	0.00	0.03	0.05	0.12	0.06	0.05	0.20	0.17	0.10	0.16	0.06	0.12	0.05	0.18	0.07	0.13	0.03
SQL P3: ORDER BY and GROUP BY	0.03	0.05	0.02	0.00	0.00	0.00	0.00	0.03	0.02	0.06	0.15	0.16	0.14	0.21	0.20	0.09	0.14	0.13	0.12	0.06	0.08	0.12	0.12	0.02
SQL P2: WHERE	0.03	0.02	0.01	0.00	0.00	0.03	0.00	0.01	0.03	0.18	0.27	0.24	0.20	0.25	0.22	0.09	0.12	0.15	0.09	0.10	0.20	0.17	0.17	0.08
SQL P2: Aggregates	0.02	0.05	0.02	0.00	0.00	0.00	0.02	0.01	0.01	0.05	0.14	0.12	0.14	0.14	0.08	0.07	0.07	0.10	0.16	0.12	0.06	0.08	0.07	0.10
SQL Introduction	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02	0.07	0.10	0.19	0.20	0.15	0.18	0.21	0.18	0.18	0.23	0.09	0.03	0.07	0.02	0.12	0.07
Total number of interactions	0.40	0.26	0.12	0.14	0.08	0.08	0.05	0.09	0.26	0.85	1.55	1.62	1.30	1.92	1.83	1.37	1.71	1.39	1.28	0.98	1.28	1.05	1.01	0.68

Figure 9.3 16 Interactions with practical course material's videos by 2019_U per student with time

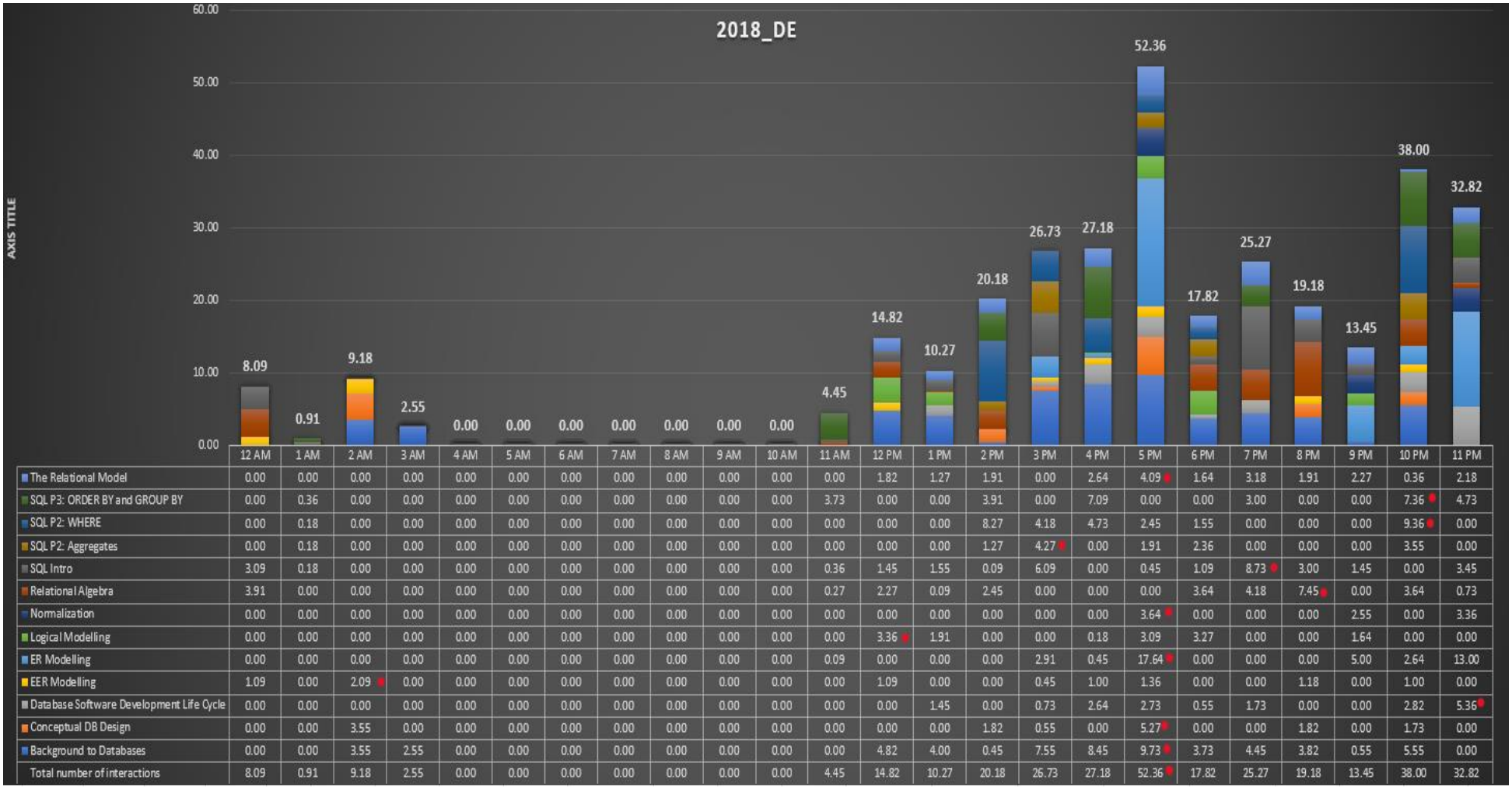
Groups	Total Number of students	Background to Databases	Conceptual DB Design	Database Software Development Life Cycle	EER Modelling	ER Modelling	Logical Modelling	Normalization	Relational Algebra	SQL Intro	SQL P2: Aggregates	SQL P2: WHERE	SQL P3: ORDER BY and GROUP BY	The Relational Model
2018_F2F	100	49.61	12.49	14.79	7.45	39.44	13.49	15.74	26.57	33.53	14.99	34.67	40.23	21.17
2018_DE	11	59.18	14.73	18.00	9.27	41.73	13.45	9.55	28.64	31.00	13.55	30.73	30.18	23.27
2019_DE	38	22.32	7.53	7.79	4.26	17.71	7.66	9.50	12.87	8.34	4.55	9.42	11.00	10.37
2019_GE	50	34.02	12.36	10.48	6.22	33.16	11.40	17.00	17.74	14.06	6.46	12.98	13.32	12.98
2019_U	173	22.86	5.28	5.21	2.50	14.72	4.39	6.14	9.23	5.80	3.36	5.55	4.97	8.33

Table 9 IPS with reflection quizzes throughout the semester



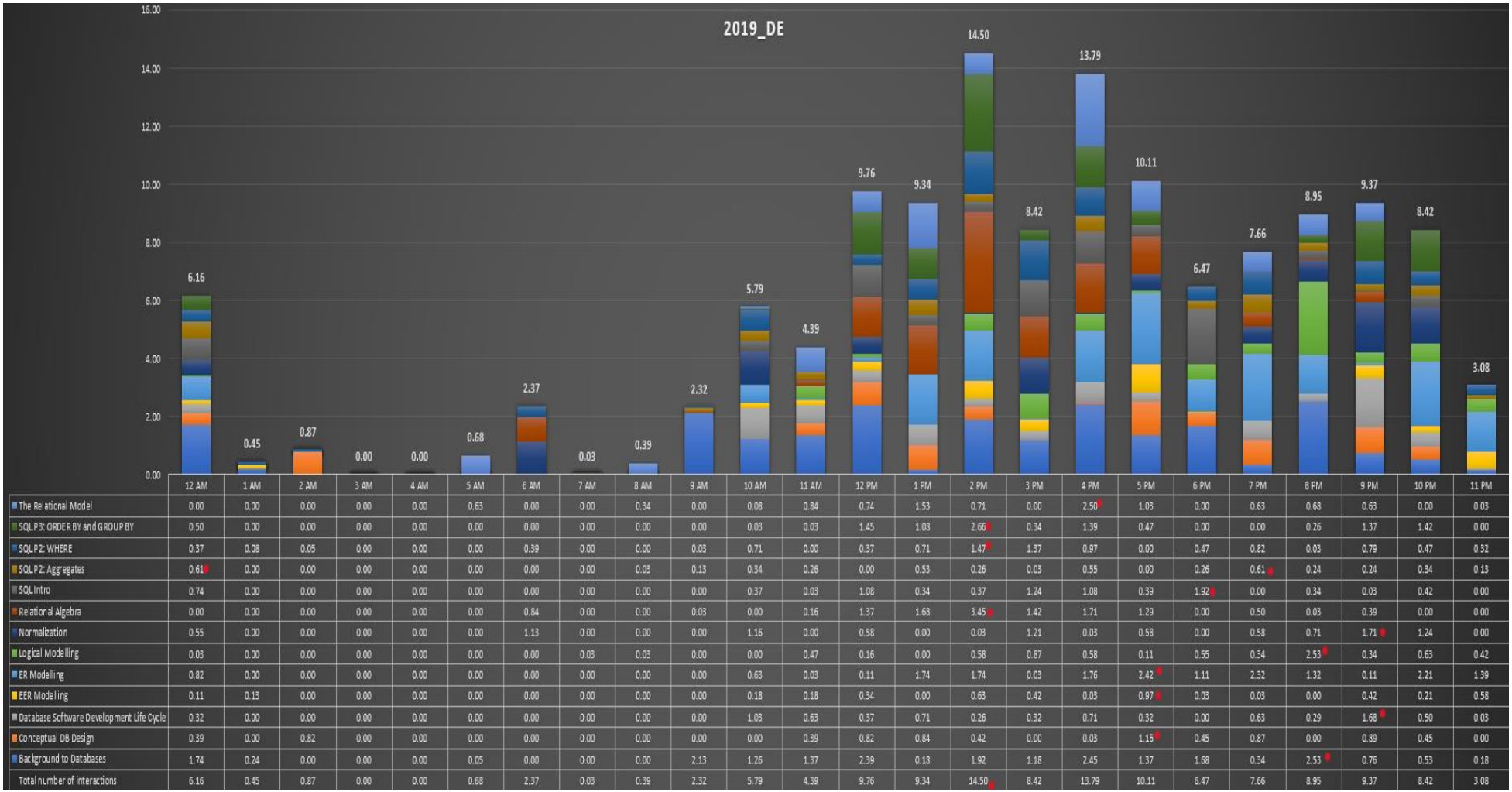
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
The Relational Model	1.58	0.24	0.14	0	0	0	0	0.44	0.51	0.86	1.9	1.32	1.91	0.87	1.91	1.73	0.79	1.01	1.22	0.13	1.9	0.37	1.8	0.54
SQL P3: ORDER BY and GROUP BY	0.74	0.24	0.13	0.01	0	0	0	0	0.04	1.68	3.97	4.14	2.52	3.19	7.64	3.3	0.23	3.53	1.73	1.6	1.25	1.63	2.04	0.62
SQL P2: WHERE	0.23	0.89	0.42	0	0	0	0	0	0.1	3.22	2.21	0.51	3.1	2.23	6.59	1.41	3.17	2.62	0.73	0.71	1.4	2.48	1.63	1.02
SQL P2: Aggregates	0.28	0.53	0.14	0	0	0	0	0	0.25	0.81	0.95	0.18	1.31	0.64	4.07	0.61	1.47	0.9	0.37	0.31	0.19	0.95	0.65	0.38
SQL Intro	1.42	0.87	0	0	0.3	0	0	0	1.6	0.95	2.99	2.71	2.05	2.51	3.81	2.14	2.02	0.74	1.05	1.43	1.17	0.7	2.64	2.43
Relational Algebra	1.21	0.11	0.57	0	0	0	0	0	0.77	1.2	2.21	2.92	2.04	1.51	2.27	2.17	0.78	0.39	1.18	1.15	2.03	1.52	1.6	0.94
Normalization	0.44	1.05	0.18	0	0	0	0.32	0.04	0.66	0.05	0.04	0.79	1.57	0.41	2.03	0.54	1.26	0.3	0	0.68	1.63	0.58	1.59	1.58
Logical Modelling	0.35	0.4	0	0.01	0	0	0	0	0	0.93	1.59	1.25	0.58	0.67	0.18	1.11	0.84	0.41	1.36	0.69	0.71	0.75	0.45	1.21
ER Modelling	2.03	2.61	0	0.27	0	0	0	0	0.24	0.98	1.34	4.19	4.41	3.6	2.34	4.4	1.02	1.9	1.6	0.97	2.76	1.35	2.81	0.62
EER Modelling	0.23	0.35	0	0	0	0	0	0	0.02	0.04	0.73	0.63	0.91	0.63	0.86	0.84	0.2	0.18	0.01	0.22	0.38	0.64	0.33	0.25
Database Software Development Life Cycle	0.68	0.28	0	0	0	0	0	0	0.28	0.3	1.95	0.61	1.2	2.45	1.65	1.14	0.99	0.5	0.18	0.6	0.97	0.24	0.19	0.58
Conceptual DB Design	0.26	0.89	0.02	0	0	0	0	0.02	0	0.2	1.92	0.75	1.33	0.8	0.55	1.95	0.73	0.17	0.33	0.51	0.05	0.75	0.7	0.56
Background to Databases	1.97	0.26	0.07	0.01	0.34	0	0.01	0.65	0.29	1.54	5.42	1.62	5.95	2	4.41	5.44	2.13	3.29	3.52	2.29	4.22	1.4	1.25	1.53
Total number of interactions	11.42	8.72	1.67	0.3	0.64	0	0.33	1.15	4.76	12.76	27.22	21.62	28.88	21.51	38.31	26.78	15.63	15.94	13.28	11.29	18.66	13.36	17.68	12.26

Figure 9.3 17 Interactions with reflection quizzes by 2018_F2F per student with time



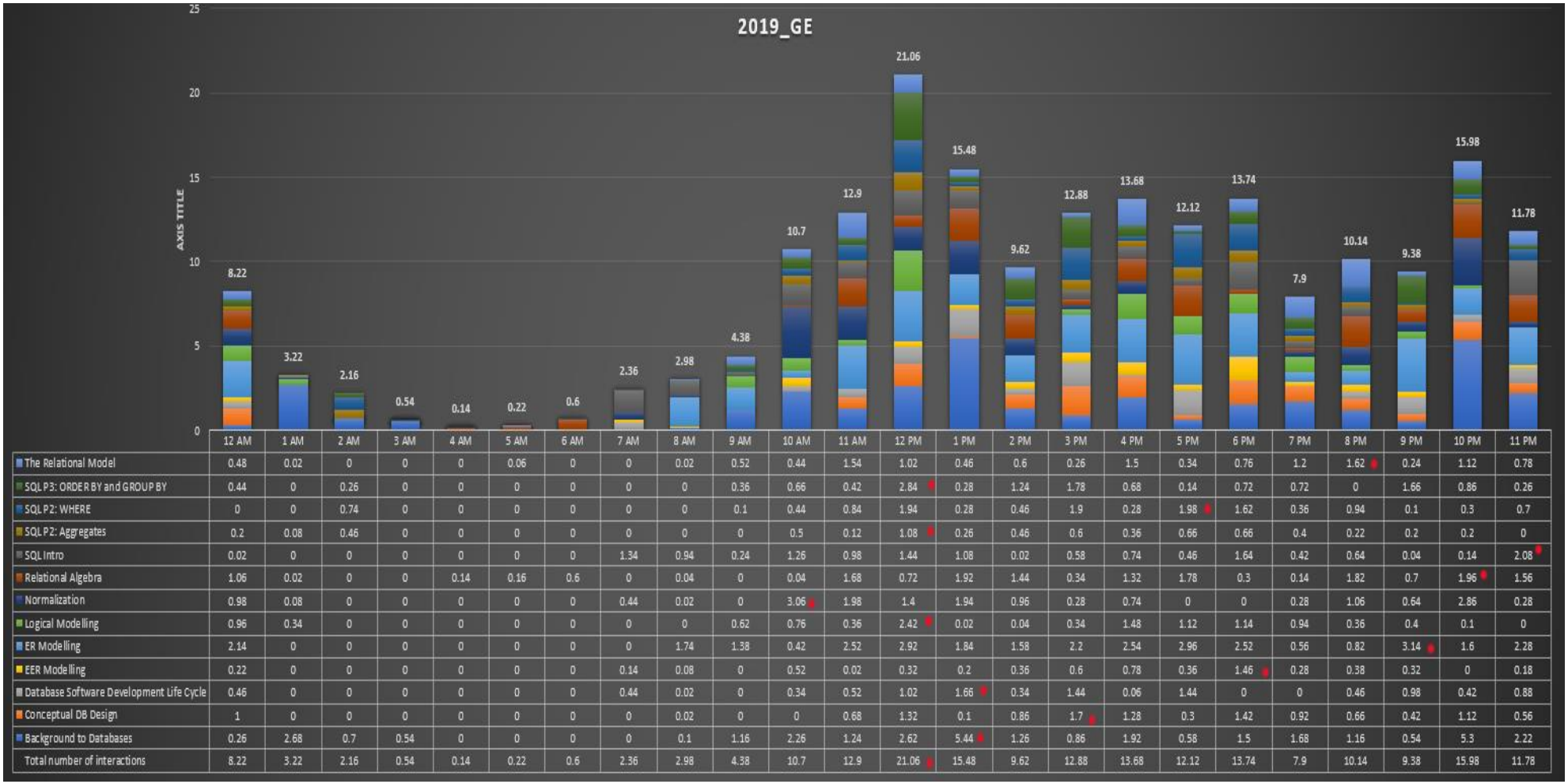
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
The Relational Model	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.82	1.27	1.91	0.00	2.64	4.09	1.64	3.18	1.91	2.27	0.36	2.18
SQL P3: ORDER BY and GROUP BY	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.73	0.00	0.00	3.91	0.00	7.09	0.00	0.00	3.00	0.00	0.00	7.36	4.73
SQL P2: WHERE	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.27	4.18	4.73	2.45	1.55	0.00	0.00	0.00	9.36	0.00
SQL P2: Aggregates	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27	4.27	0.00	1.91	2.36	0.00	0.00	0.00	3.55	0.00
SQL Intro	3.09	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	1.45	1.55	0.09	6.09	0.00	0.45	1.09	8.73	3.00	1.45	0.00	3.45
Relational Algebra	3.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	2.27	0.09	2.45	0.00	0.00	0.00	3.64	4.18	7.45	0.00	3.64	0.73
Normalization	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.64	0.00	0.00	0.00	2.55	0.00	3.36
Logical Modelling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.36	1.91	0.00	0.00	0.18	3.09	3.27	0.00	0.00	1.64	0.00	0.00
ER Modelling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	2.91	0.45	17.64	0.00	0.00	0.00	5.00	2.64	13.00
EER Modelling	1.09	0.00	2.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.09	0.00	0.00	0.45	1.00	1.36	0.00	0.00	1.18	0.00	1.00	0.00
Database Software Development Life Cycle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.45	0.00	0.73	2.64	2.73	0.55	1.73	0.00	0.00	2.82	5.36
Conceptual DB Design	0.00	0.00	3.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.82	0.55	0.00	5.27	0.00	0.00	1.82	0.00	1.73	0.00
Background to Databases	0.00	0.00	3.55	2.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.82	4.00	0.45	7.55	8.45	9.73	3.73	4.45	3.82	0.55	5.55	0.00
Total number of interactions	8.09	0.91	9.18	2.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.45	14.82	10.27	20.18	26.73	27.18	52.36	17.82	25.27	19.18	13.45	38.00	32.82

Figure 9.3 18 Interactions with reflection quizzes by 2018_DE per student with time



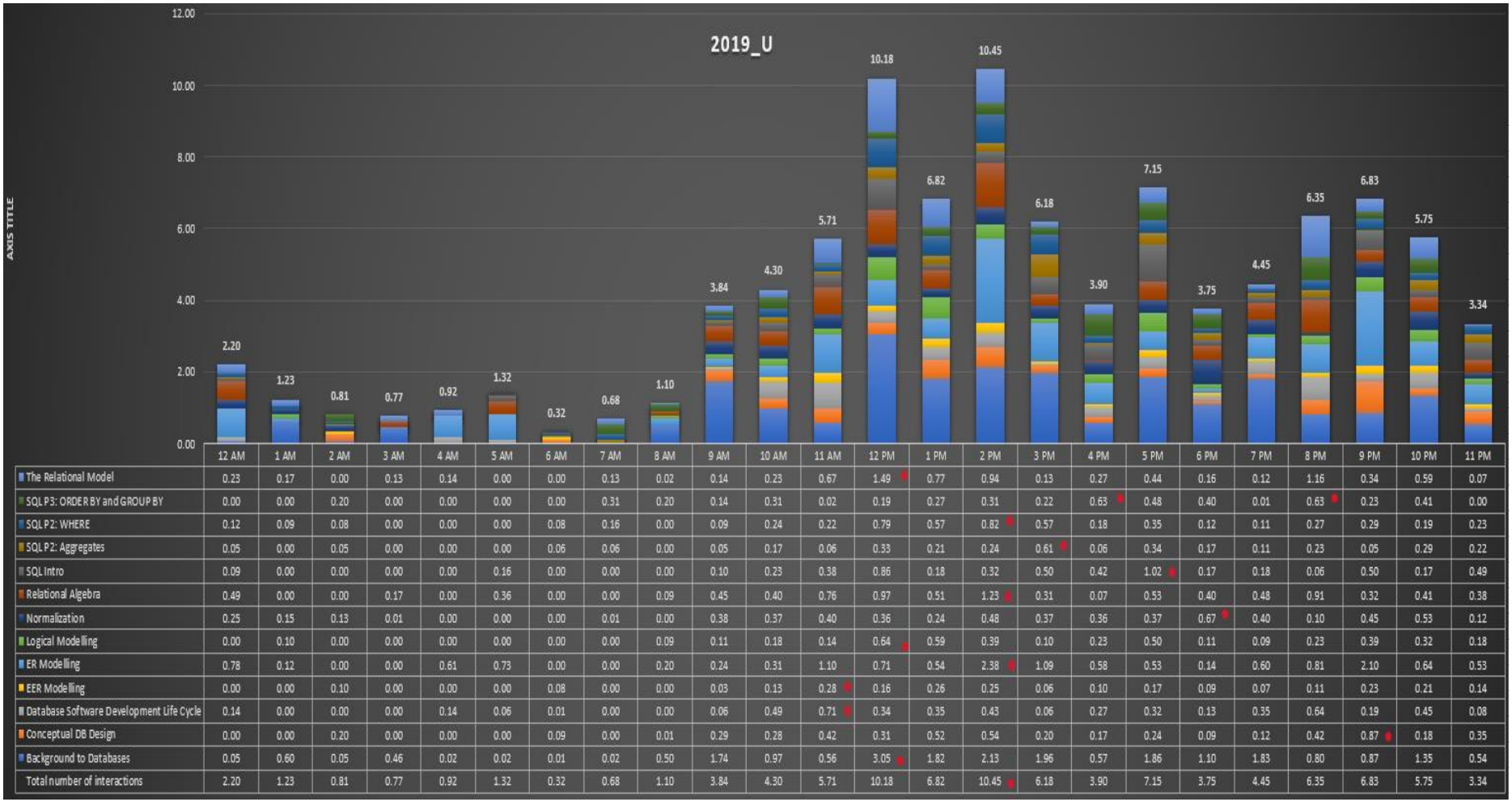
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
The Relational Model	0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.00	0.34	0.00	0.08	0.84	0.74	1.53	0.71	0.00	2.50	1.03	0.00	0.63	0.68	0.63	0.00	0.03
SQL P3: ORDER BY and GROUP BY	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	1.45	1.08	2.66	0.34	1.39	0.47	0.00	0.00	0.26	1.37	1.42	0.00
SQL P2: WHERE	0.37	0.08	0.05	0.00	0.00	0.00	0.39	0.00	0.00	0.03	0.71	0.00	0.37	0.71	1.47	1.37	0.97	0.00	0.47	0.82	0.03	0.79	0.47	0.32
SQL P2: Aggregates	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.13	0.34	0.26	0.00	0.53	0.26	0.03	0.55	0.00	0.26	0.61	0.24	0.24	0.34	0.13
SQL Intro	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.03	1.08	0.34	0.37	1.24	1.08	0.39	1.92	0.00	0.34	0.03	0.42	0.00
Relational Algebra	0.00	0.00	0.00	0.00	0.00	0.00	0.84	0.00	0.00	0.03	0.00	0.16	1.37	1.68	3.45	1.42	1.71	1.29	0.00	0.50	0.03	0.39	0.00	0.00
Normalization	0.55	0.00	0.00	0.00	0.00	0.00	1.13	0.00	0.00	0.00	1.16	0.00	0.58	0.00	0.03	1.21	0.03	0.58	0.00	0.58	0.71	1.71	1.24	0.00
Logical Modelling	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.47	0.16	0.00	0.58	0.87	0.58	0.11	0.55	0.34	2.53	0.34	0.63	0.42
ER Modelling	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.03	0.11	1.74	1.74	0.03	1.76	2.42	1.11	2.32	1.32	0.11	2.21	1.39
EER Modelling	0.11	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.18	0.34	0.00	0.63	0.42	0.03	0.97	0.03	0.03	0.00	0.42	0.21	0.58
Database Software Development Life Cycle	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.03	0.63	0.37	0.71	0.26	0.32	0.71	0.32	0.00	0.63	0.29	1.68	0.50	0.03
Conceptual DB Design	0.39	0.00	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.82	0.84	0.42	0.00	0.03	1.16	0.45	0.87	0.00	0.89	0.45	0.00
Background to Databases	1.74	0.24	0.00	0.00	0.00	0.05	0.00	0.00	0.00	2.13	1.26	1.37	2.39	0.18	1.92	1.18	2.45	1.37	1.68	0.34	2.53	0.76	0.53	0.18
Total number of interactions	6.16	0.45	0.87	0.00	0.00	0.68	2.37	0.03	0.39	2.32	5.79	4.39	9.76	9.34	14.50	8.42	13.79	10.11	6.47	7.66	8.95	9.37	8.42	3.08

Figure 9.3 19 Interactions with reflection quizzes by 2019_DE per student with time



	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
The Relational Model	0.48	0.02	0	0	0	0.06	0	0	0.02	0.52	0.44	1.54	1.02	0.46	0.6	0.26	1.5	0.34	0.76	1.2	1.62	0.24	1.12	0.78
SQL P3: ORDER BY and GROUP BY	0.44	0	0.26	0	0	0	0	0	0	0.36	0.66	0.42	2.84	0.28	1.24	1.78	0.68	0.14	0.72	0.72	0	1.66	0.86	0.26
SQL P2: WHERE	0	0	0.74	0	0	0	0	0	0	0.1	0.44	0.84	1.94	0.28	0.46	1.9	0.28	1.98	1.62	0.36	0.94	0.1	0.3	0.7
SQL P2: Aggregates	0.2	0.08	0.46	0	0	0	0	0	0	0	0.5	0.12	1.08	0.26	0.46	0.6	0.36	0.66	0.66	0.4	0.22	0.2	0.2	0
SQL Intro	0.02	0	0	0	0	0	0	1.34	0.94	0.24	1.26	0.98	1.44	1.08	0.02	0.58	0.74	0.46	1.64	0.42	0.64	0.04	0.14	2.08
Relational Algebra	1.06	0.02	0	0	0.14	0.16	0.6	0	0.04	0	0.04	1.68	0.72	1.92	1.44	0.34	1.32	1.78	0.3	0.14	1.82	0.7	1.96	1.56
Normalization	0.98	0.08	0	0	0	0	0	0.44	0.02	0	3.06	1.98	1.4	1.94	0.96	0.28	0.74	0	0	0.28	1.06	0.64	2.86	0.28
Logical Modelling	0.96	0.34	0	0	0	0	0	0	0	0.62	0.76	0.36	2.42	0.02	0.04	0.34	1.48	1.12	1.14	0.94	0.36	0.4	0.1	0
ER Modelling	2.14	0	0	0	0	0	0	0	1.74	1.38	0.42	2.52	2.92	1.84	1.58	2.2	2.54	2.96	2.52	0.56	0.82	3.14	1.6	2.28
EER Modelling	0.22	0	0	0	0	0	0	0.14	0.08	0	0.52	0.02	0.32	0.2	0.36	0.6	0.78	0.36	1.46	0.28	0.38	0.32	0	0.18
Database Software Development Life Cycle	0.46	0	0	0	0	0	0	0.44	0.02	0	0.34	0.52	1.02	1.66	0.34	1.44	0.06	1.44	0	0	0.46	0.98	0.42	0.88
Conceptual DB Design	1	0	0	0	0	0	0	0	0.02	0	0	0.68	1.32	0.1	0.86	1.7	1.28	0.3	1.42	0.92	0.66	0.42	1.12	0.56
Background to Databases	0.26	2.68	0.7	0.54	0	0	0	0	0.1	1.16	2.26	1.24	2.62	5.44	1.26	0.86	1.92	0.58	1.5	1.68	1.16	0.54	5.3	2.22
Total number of interactions	8.22	3.22	2.16	0.54	0.14	0.22	0.6	2.36	2.98	4.38	10.7	12.9	21.06	15.48	9.62	12.88	13.68	12.12	13.74	7.9	10.14	9.38	15.98	11.78

Figure 9.3 20 Interactions with reflection quizzes by 2019_GE per student with time

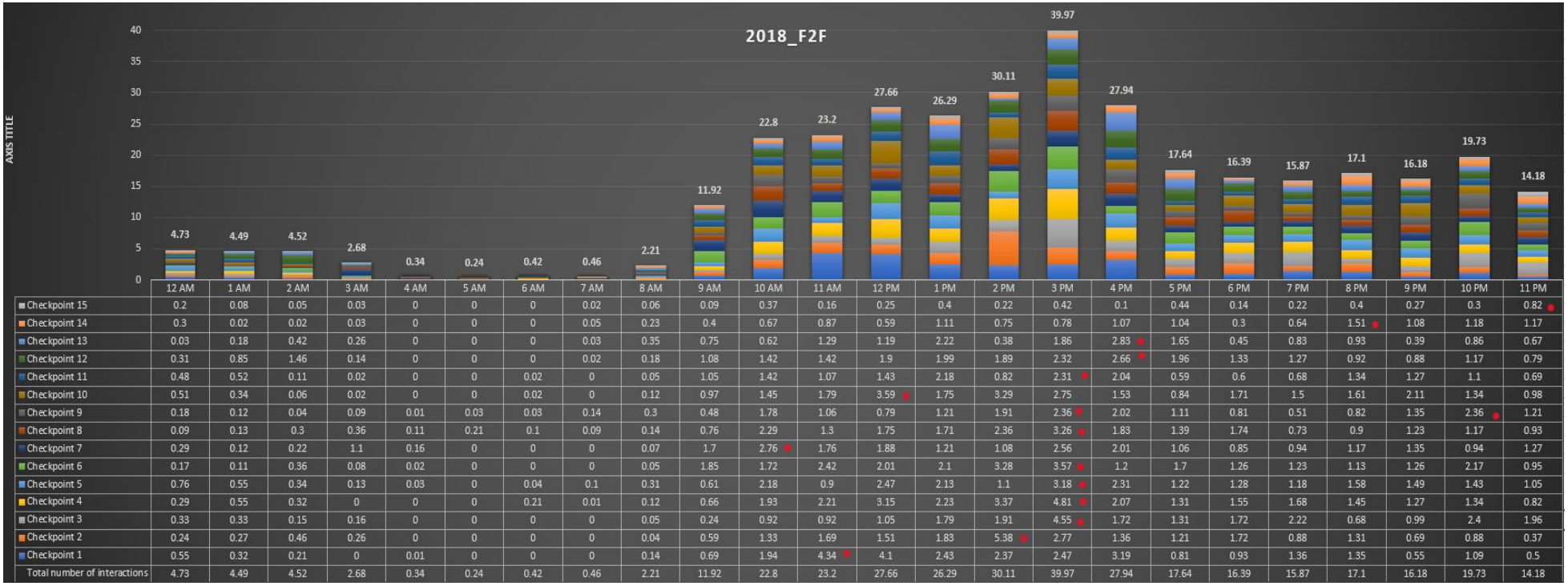


	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
The Relational Model	0.23	0.17	0.00	0.13	0.14	0.00	0.00	0.13	0.02	0.14	0.23	0.67	1.49	0.77	0.94	0.13	0.27	0.44	0.16	0.12	1.16	0.34	0.59	0.07
SQL P3: ORDER BY and GROUP BY	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.31	0.20	0.14	0.31	0.02	0.19	0.27	0.31	0.22	0.63	0.48	0.40	0.01	0.63	0.23	0.41	0.00
SQL P2: WHERE	0.12	0.09	0.08	0.00	0.00	0.00	0.08	0.16	0.00	0.09	0.24	0.22	0.79	0.57	0.82	0.57	0.18	0.35	0.12	0.11	0.27	0.29	0.19	0.23
SQL P2: Aggregates	0.05	0.00	0.05	0.00	0.00	0.00	0.06	0.06	0.00	0.05	0.17	0.06	0.33	0.21	0.24	0.61	0.06	0.34	0.17	0.11	0.23	0.05	0.29	0.22
SQL Intro	0.09	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.00	0.10	0.23	0.38	0.86	0.18	0.32	0.50	0.42	1.02	0.17	0.18	0.06	0.50	0.17	0.49
Relational Algebra	0.49	0.00	0.00	0.17	0.00	0.36	0.00	0.00	0.09	0.45	0.40	0.76	0.97	0.51	1.23	0.31	0.07	0.53	0.40	0.48	0.91	0.32	0.41	0.38
Normalization	0.25	0.15	0.13	0.01	0.00	0.00	0.00	0.01	0.00	0.38	0.37	0.40	0.36	0.24	0.48	0.37	0.36	0.37	0.67	0.40	0.10	0.45	0.53	0.12
Logical Modelling	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.11	0.18	0.14	0.64	0.59	0.39	0.10	0.23	0.50	0.11	0.09	0.23	0.39	0.32	0.18
ER Modelling	0.78	0.12	0.00	0.00	0.61	0.73	0.00	0.00	0.20	0.24	0.31	1.10	0.71	0.54	2.38	1.09	0.58	0.53	0.14	0.60	0.81	2.10	0.64	0.53
EER Modelling	0.00	0.00	0.10	0.00	0.00	0.00	0.08	0.00	0.00	0.03	0.13	0.28	0.16	0.26	0.25	0.06	0.10	0.17	0.09	0.07	0.11	0.23	0.21	0.14
Database Software Development Life Cycle	0.14	0.00	0.00	0.00	0.14	0.06	0.01	0.00	0.00	0.06	0.49	0.71	0.34	0.35	0.43	0.06	0.27	0.32	0.13	0.35	0.64	0.19	0.45	0.08
Conceptual DB Design	0.00	0.00	0.20	0.00	0.00	0.00	0.09	0.00	0.01	0.29	0.28	0.42	0.31	0.52	0.54	0.20	0.17	0.24	0.09	0.12	0.42	0.87	0.18	0.35
Background to Databases	0.05	0.60	0.05	0.46	0.02	0.02	0.01	0.02	0.50	1.74	0.97	0.56	3.05	1.82	2.13	1.96	0.57	1.86	1.10	1.83	0.80	0.87	1.35	0.54
Total number of interactions	2.20	1.23	0.81	0.77	0.92	1.32	0.32	0.68	1.10	3.84	4.30	5.71	10.18	6.82	10.45	6.18	3.90	7.15	3.75	4.45	6.35	6.83	5.75	3.34

Figure 9.3 21 Interactions with reflection quizzes by 2019_U per student with time

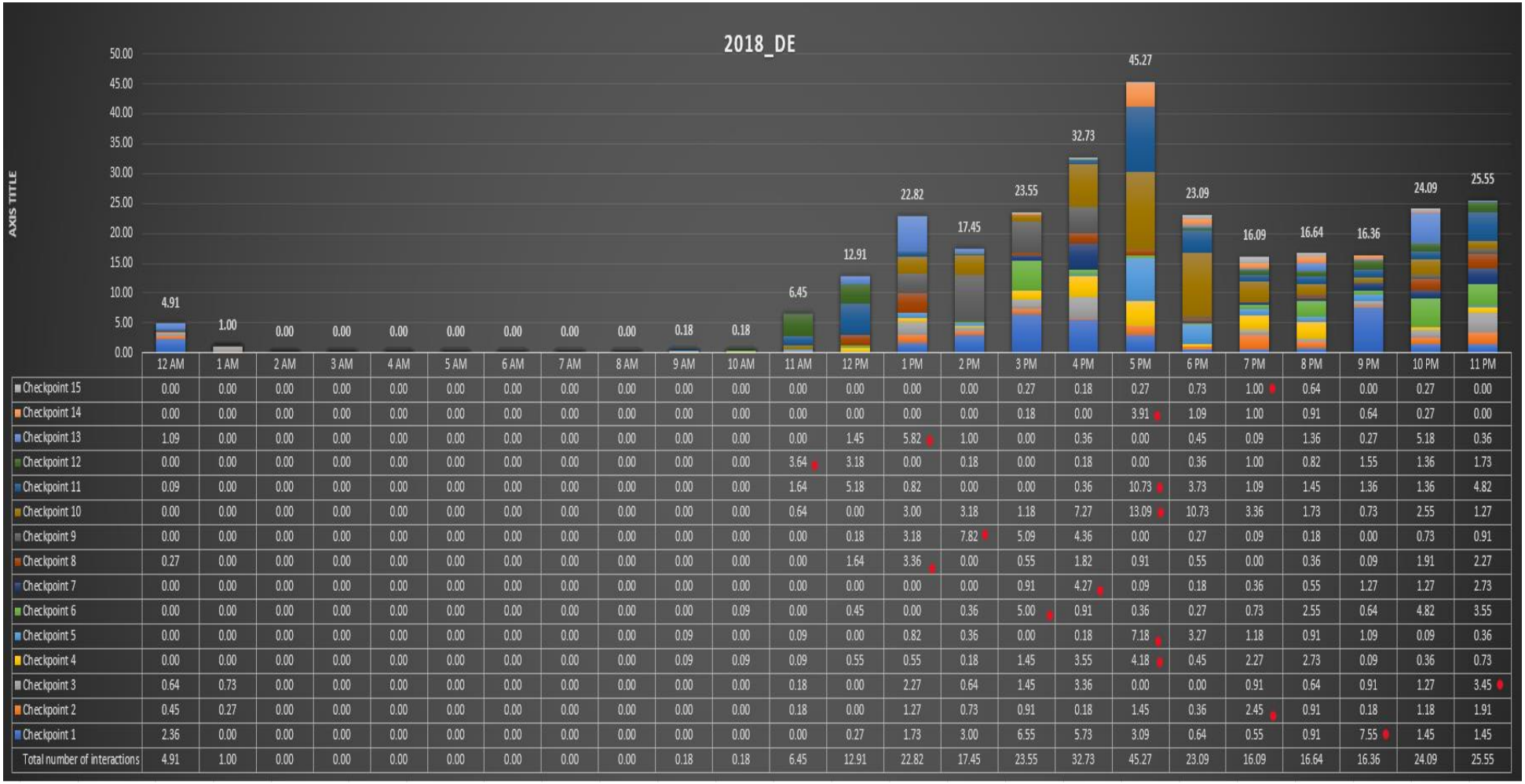
Groups	Total Number of students	Checkpoint 1	Checkpoint 2	Checkpoint 3	Checkpoint 4	Checkpoint 5	Checkpoint 6	Checkpoint 7	Checkpoint 8	Checkpoint 9	Checkpoint 10	Checkpoint 11	Checkpoint 12	Checkpoint 13	Checkpoint 14	Checkpoint 15
2018_F2F	100	29.35	24.79	25.40	31.35	26.37	28.64	24.50	24.88	20.72	28.28	19.79	25.96	18.19	13.81	5.04
2018_DE	11	35.27	12.45	16.45	17.36	15.64	19.73	11.64	13.73	22.82	48.73	32.64	14.00	17.45	8.00	3.36
2019_DE	38	19.66	20.24	25.47	29.63	23.18	25.32	27.87	32.21	20.95	20.95	19.61	19.37	16.03	15.08	4.18
2019_GE	50	17.62	19.32	18.70	22.90	17.22	16.94	17.30	21.78	15.62	15.12	12.58	14.74	11.96	13.86	6.38
2019_U	173	19.90	24.29	20.49	30.43	27.57	22.54	21.84	27.01	17.57	21.16	16.73	24.17	18.45	14.46	4.93

Table 10 IPS with practical quizzes (checkpoints)



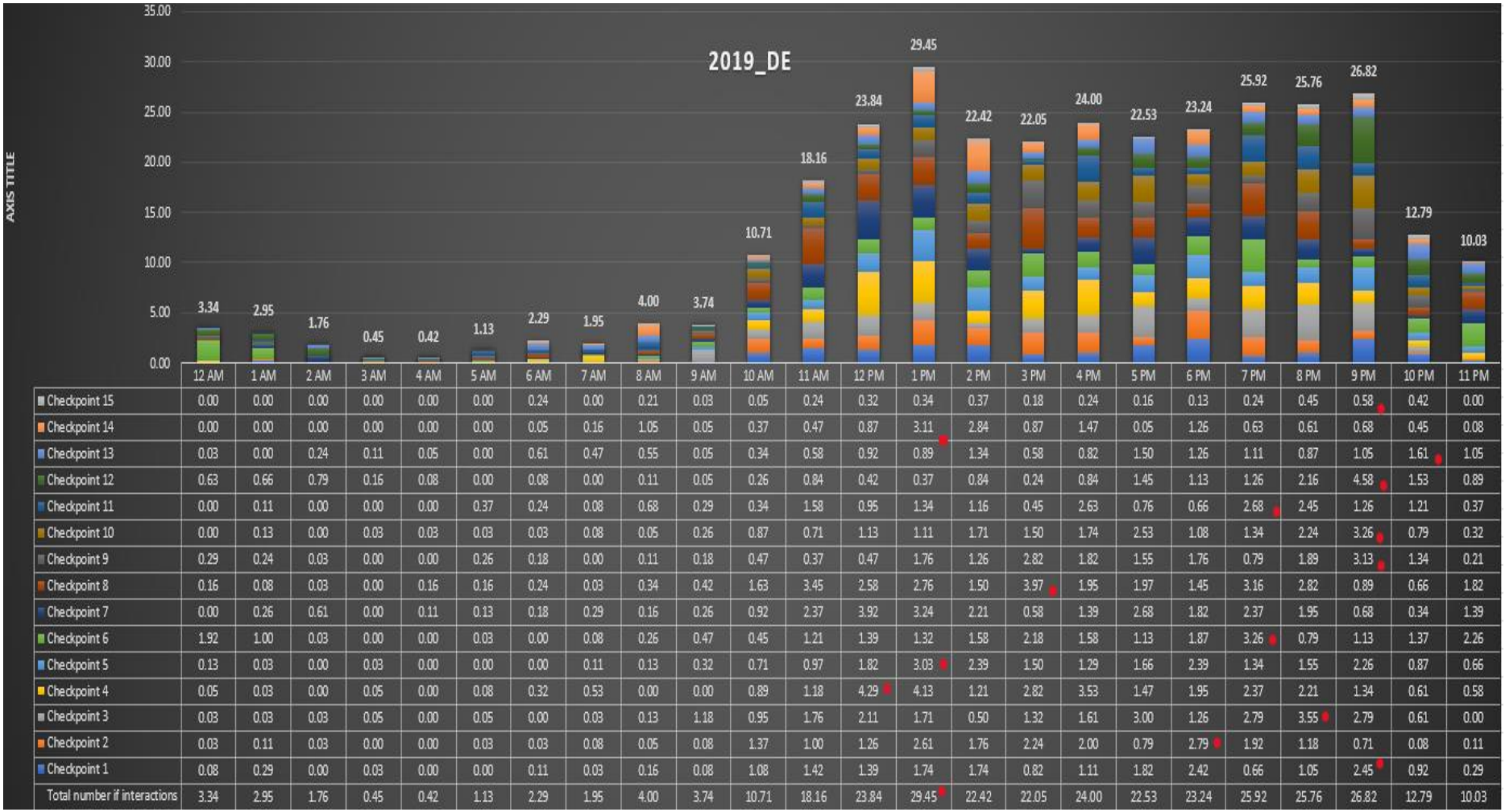
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Checkpoint 15	0.2	0.08	0.05	0.03	0	0	0	0.02	0.06	0.09	0.37	0.16	0.25	0.4	0.22	0.42	0.1	0.44	0.14	0.22	0.4	0.27	0.3	0.82
Checkpoint 14	0.3	0.02	0.02	0.03	0	0	0	0.05	0.23	0.4	0.67	0.87	0.59	1.11	0.75	0.78	1.07	1.04	0.3	0.64	1.51	1.08	1.18	1.17
Checkpoint 13	0.03	0.18	0.42	0.26	0	0	0	0.03	0.35	0.75	0.62	1.29	1.19	2.22	0.38	1.86	2.83	1.65	0.45	0.83	0.93	0.39	0.86	0.67
Checkpoint 12	0.31	0.85	1.46	0.14	0	0	0	0.02	0.18	1.08	1.42	1.42	1.9	1.99	1.89	2.32	2.66	1.96	1.33	1.27	0.92	0.88	1.17	0.79
Checkpoint 11	0.48	0.52	0.11	0.02	0	0	0.02	0	0.05	1.05	1.42	1.07	1.43	2.18	0.82	2.31	2.04	0.59	0.6	0.68	1.34	1.27	1.1	0.69
Checkpoint 10	0.51	0.34	0.06	0.02	0	0	0.02	0	0.12	0.97	1.45	1.79	3.59	1.75	3.29	2.75	1.53	0.84	1.71	1.5	1.61	2.11	1.34	0.98
Checkpoint 9	0.18	0.12	0.04	0.09	0.01	0.03	0.03	0.14	0.3	0.48	1.78	1.06	0.79	1.21	1.91	2.36	2.02	1.11	0.81	0.51	0.82	1.35	2.36	1.21
Checkpoint 8	0.09	0.13	0.3	0.36	0.11	0.21	0.1	0.09	0.14	0.76	2.29	1.3	1.75	1.71	2.36	3.26	1.83	1.39	1.74	0.73	0.9	1.23	1.17	0.93
Checkpoint 7	0.29	0.12	0.22	1.1	0.16	0	0	0	0.07	1.7	2.76	1.76	1.88	1.21	1.08	2.56	2.01	1.06	0.85	0.94	1.17	1.35	0.94	1.27
Checkpoint 6	0.17	0.11	0.36	0.08	0.02	0	0	0	0.05	1.85	1.72	2.42	2.01	2.1	3.28	3.57	1.2	1.7	1.26	1.23	1.13	1.26	2.17	0.95
Checkpoint 5	0.76	0.55	0.34	0.13	0.03	0	0.04	0.1	0.31	0.61	2.18	0.9	2.47	2.13	1.1	3.18	2.31	1.22	1.28	1.18	1.58	1.49	1.43	1.05
Checkpoint 4	0.29	0.55	0.32	0	0	0	0.21	0.01	0.12	0.66	1.93	2.21	3.15	2.23	3.37	4.81	2.07	1.31	1.55	1.68	1.45	1.27	1.34	0.82
Checkpoint 3	0.33	0.33	0.15	0.16	0	0	0	0	0.05	0.24	0.92	0.92	1.05	1.79	1.91	4.55	1.72	1.31	1.72	2.22	0.68	0.99	2.4	1.96
Checkpoint 2	0.24	0.27	0.46	0.26	0	0	0	0	0.04	0.59	1.33	1.69	1.51	1.83	5.38	2.77	1.36	1.21	1.72	0.88	1.31	0.69	0.88	0.37
Checkpoint 1	0.55	0.32	0.21	0	0.01	0	0	0	0.14	0.69	1.94	4.34	4.1	2.43	2.37	2.47	3.19	0.81	0.93	1.36	1.35	0.55	1.09	0.5
Total number of interactions	4.73	4.49	4.52	2.68	0.34	0.24	0.42	0.46	2.21	11.92	22.8	23.2	27.66	26.29	30.11	39.97	27.94	17.64	16.39	15.87	17.1	16.18	19.73	14.18

Figure 9.3 22 Interactions with practical quizzes (checkpoints) by 2018_F2F per student with time



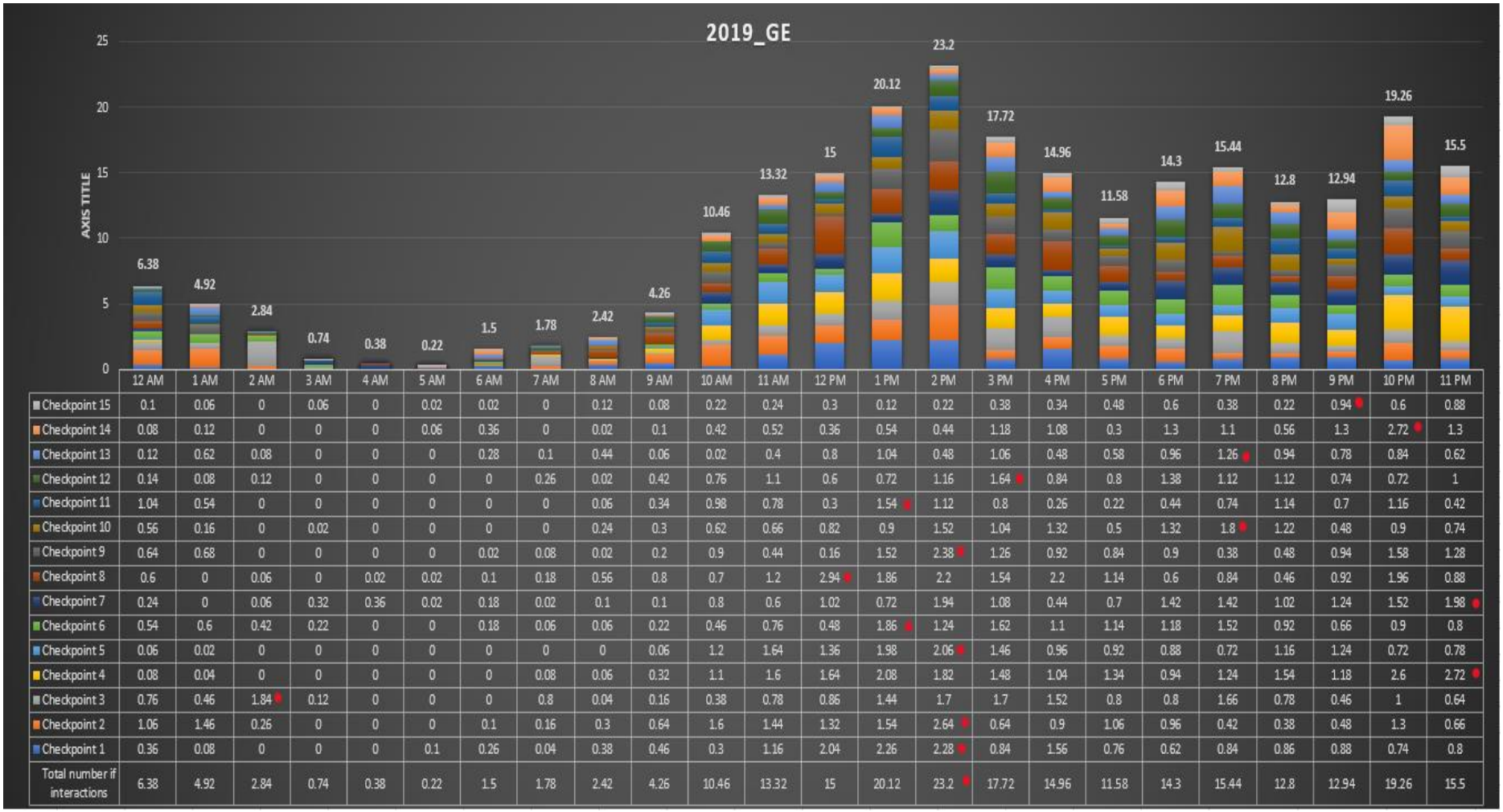
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Checkpoint 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.18	0.27	0.73	1.00	0.64	0.00	0.27	0.00
Checkpoint 14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	3.91	1.09	1.00	0.91	0.64	0.27	0.00
Checkpoint 13	1.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.45	5.82	1.00	0.00	0.36	0.00	0.45	0.09	1.36	0.27	5.18	0.36
Checkpoint 12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.64	3.18	0.00	0.18	0.00	0.18	0.00	0.36	1.00	0.82	1.55	1.36	1.73
Checkpoint 11	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.64	5.18	0.82	0.00	0.00	0.36	10.73	3.73	1.09	1.45	1.36	1.36	4.82
Checkpoint 10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.00	3.00	3.18	1.18	7.27	13.09	10.73	3.36	1.73	0.73	2.55	1.27
Checkpoint 9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	3.18	7.82	5.09	4.36	0.00	0.27	0.09	0.18	0.00	0.73	0.91
Checkpoint 8	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.64	3.36	0.00	0.55	1.82	0.91	0.55	0.00	0.36	0.09	1.91	2.27
Checkpoint 7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91	4.27	0.09	0.18	0.36	0.55	1.27	1.27	2.73
Checkpoint 6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.45	0.00	0.36	5.00	0.91	0.36	0.27	0.73	2.55	0.64	4.82	3.55
Checkpoint 5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.09	0.00	0.82	0.36	0.00	0.18	7.18	3.27	1.18	0.91	1.09	0.09	0.36
Checkpoint 4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.09	0.55	0.55	0.18	1.45	3.55	4.18	0.45	2.27	2.73	0.09	0.36	0.73
Checkpoint 3	0.64	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	2.27	0.64	1.45	3.36	0.00	0.00	0.91	0.64	0.91	1.27	3.45
Checkpoint 2	0.45	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	1.27	0.73	0.91	0.18	1.45	0.36	2.45	0.91	0.18	1.18	1.91
Checkpoint 1	2.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	1.73	3.00	6.55	5.73	3.09	0.64	0.55	0.91	7.55	1.45	1.45
Total number of interactions	4.91	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.18	6.45	12.91	22.82	17.45	23.55	32.73	45.27	23.09	16.09	16.64	16.36	24.09	25.55

Figure 9.3 23 Interactions with practical quizzes(checkpoints) by 2018_DE per student with time



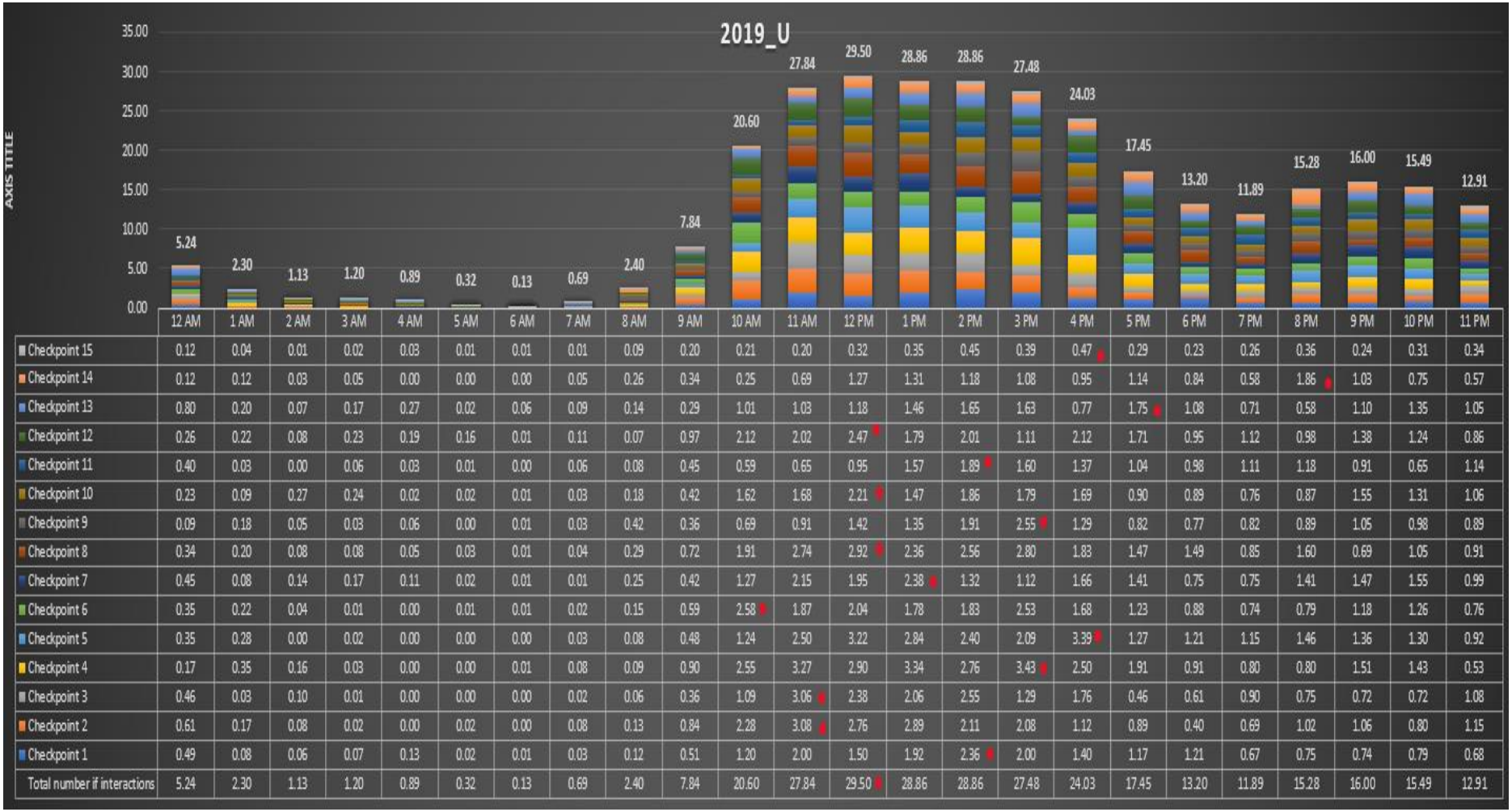
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Checkpoint 15	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.21	0.03	0.05	0.24	0.32	0.34	0.37	0.18	0.24	0.16	0.13	0.24	0.45	0.58	0.42	0.00
Checkpoint 14	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.16	1.05	0.05	0.37	0.47	0.87	3.11	2.84	0.87	1.47	0.05	1.26	0.63	0.61	0.68	0.45	0.08
Checkpoint 13	0.03	0.00	0.24	0.11	0.05	0.00	0.61	0.47	0.55	0.05	0.34	0.58	0.92	0.89	1.34	0.58	0.82	1.50	1.26	1.11	0.87	1.05	1.61	1.05
Checkpoint 12	0.63	0.66	0.79	0.16	0.08	0.00	0.08	0.00	0.11	0.05	0.26	0.84	0.42	0.37	0.84	0.24	0.84	1.45	1.13	1.26	2.16	4.58	1.53	0.89
Checkpoint 11	0.00	0.11	0.00	0.00	0.00	0.37	0.24	0.08	0.68	0.29	0.34	1.58	0.95	1.34	1.16	0.45	2.63	0.76	0.66	2.68	2.45	1.26	1.21	0.37
Checkpoint 10	0.00	0.13	0.00	0.03	0.03	0.03	0.03	0.08	0.05	0.26	0.87	0.71	1.13	1.11	1.71	1.50	1.74	2.53	1.08	1.34	2.24	3.26	0.79	0.32
Checkpoint 9	0.29	0.24	0.03	0.00	0.00	0.26	0.18	0.00	0.11	0.18	0.47	0.37	0.47	1.76	1.26	2.82	1.82	1.55	1.76	0.79	1.89	3.13	1.34	0.21
Checkpoint 8	0.16	0.08	0.03	0.00	0.16	0.16	0.24	0.03	0.34	0.42	1.63	3.45	2.58	2.76	1.50	3.97	1.95	1.97	1.45	3.16	2.82	0.89	0.66	1.82
Checkpoint 7	0.00	0.26	0.61	0.00	0.11	0.13	0.18	0.29	0.16	0.26	0.92	2.37	3.92	3.24	2.21	0.58	1.39	2.68	1.82	2.37	1.95	0.68	0.34	1.39
Checkpoint 6	1.92	1.00	0.03	0.00	0.00	0.03	0.00	0.08	0.26	0.47	0.45	1.21	1.39	1.32	1.58	2.18	1.58	1.13	1.87	3.26	0.79	1.13	1.37	2.26
Checkpoint 5	0.13	0.03	0.00	0.03	0.00	0.00	0.00	0.11	0.13	0.32	0.71	0.97	1.82	3.03	2.39	1.50	1.29	1.66	2.39	1.34	1.55	2.26	0.87	0.66
Checkpoint 4	0.05	0.03	0.00	0.05	0.00	0.08	0.32	0.53	0.00	0.00	0.89	1.18	4.29	4.13	1.21	2.82	3.53	1.47	1.95	2.37	2.21	1.34	0.61	0.58
Checkpoint 3	0.03	0.03	0.03	0.05	0.00	0.05	0.00	0.03	0.13	1.18	0.95	1.76	2.11	1.71	0.50	1.32	1.61	3.00	1.26	2.79	3.55	2.79	0.61	0.00
Checkpoint 2	0.03	0.11	0.03	0.00	0.00	0.03	0.03	0.08	0.05	0.08	1.37	1.00	1.26	2.61	1.76	2.24	2.00	0.79	2.79	1.92	1.18	0.71	0.08	0.11
Checkpoint 1	0.08	0.29	0.00	0.03	0.00	0.00	0.11	0.03	0.16	0.08	1.08	1.42	1.39	1.74	1.74	0.82	1.11	1.82	2.42	0.66	1.05	2.45	0.92	0.29
Total number if interactions	3.34	2.95	1.76	0.45	0.42	1.13	2.29	1.95	4.00	3.74	10.71	18.16	23.84	29.45	22.42	22.05	24.00	22.53	23.24	25.92	25.76	26.82	12.79	10.03

Figure 9.3 24 Interactions with practical quizzes (checkpoints) by 2019_DE per student with time



	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Checkpoint 15	0.1	0.06	0	0.06	0	0.02	0.02	0	0.12	0.08	0.22	0.24	0.3	0.12	0.22	0.38	0.34	0.48	0.6	0.38	0.22	0.94	0.6	0.88
Checkpoint 14	0.08	0.12	0	0	0	0.06	0.36	0	0.02	0.1	0.42	0.52	0.36	0.54	0.44	1.18	1.08	0.3	1.3	1.1	0.56	1.3	2.72	1.3
Checkpoint 13	0.12	0.62	0.08	0	0	0	0.28	0.1	0.44	0.06	0.02	0.4	0.8	1.04	0.48	1.06	0.48	0.58	0.96	1.26	0.94	0.78	0.84	0.62
Checkpoint 12	0.14	0.08	0.12	0	0	0	0	0.26	0.02	0.42	0.76	1.1	0.6	0.72	1.16	1.64	0.84	0.8	1.38	1.12	1.12	0.74	0.72	1
Checkpoint 11	1.04	0.54	0	0	0	0	0	0	0.06	0.34	0.98	0.78	0.3	1.54	1.12	0.8	0.26	0.22	0.44	0.74	1.14	0.7	1.16	0.42
Checkpoint 10	0.56	0.16	0	0.02	0	0	0	0	0.24	0.3	0.62	0.66	0.82	0.9	1.52	1.04	1.32	0.5	1.32	1.8	1.22	0.48	0.9	0.74
Checkpoint 9	0.64	0.68	0	0	0	0	0.02	0.08	0.02	0.2	0.9	0.44	0.16	1.52	2.38	1.26	0.92	0.84	0.9	0.38	0.48	0.94	1.58	1.28
Checkpoint 8	0.6	0	0.06	0	0.02	0.02	0.1	0.18	0.56	0.8	0.7	1.2	2.94	1.86	2.2	1.54	2.2	1.14	0.6	0.84	0.46	0.92	1.96	0.88
Checkpoint 7	0.24	0	0.06	0.32	0.36	0.02	0.18	0.02	0.1	0.1	0.8	0.6	1.02	0.72	1.94	1.08	0.44	0.7	1.42	1.42	1.02	1.24	1.52	1.98
Checkpoint 6	0.54	0.6	0.42	0.22	0	0	0.18	0.06	0.06	0.22	0.46	0.76	0.48	1.86	1.24	1.62	1.1	1.14	1.18	1.52	0.92	0.66	0.9	0.8
Checkpoint 5	0.06	0.02	0	0	0	0	0	0	0	0.06	1.2	1.64	1.36	1.98	2.06	1.46	0.96	0.92	0.88	0.72	1.16	1.24	0.72	0.78
Checkpoint 4	0.08	0.04	0	0	0	0	0	0.08	0.06	0.32	1.1	1.6	1.64	2.08	1.82	1.48	1.04	1.34	0.94	1.24	1.54	1.18	2.6	2.72
Checkpoint 3	0.76	0.46	1.84	0.12	0	0	0	0.8	0.04	0.16	0.38	0.78	0.86	1.44	1.7	1.7	1.52	0.8	0.8	1.66	0.78	0.46	1	0.64
Checkpoint 2	1.06	1.46	0.26	0	0	0	0.1	0.16	0.3	0.64	1.6	1.44	1.32	1.54	2.64	0.64	0.9	1.06	0.96	0.42	0.38	0.48	1.3	0.66
Checkpoint 1	0.36	0.08	0	0	0	0.1	0.26	0.04	0.38	0.46	0.3	1.16	2.04	2.26	2.28	0.84	1.56	0.76	0.62	0.84	0.86	0.88	0.74	0.8
Total number if interactions	6.38	4.92	2.84	0.74	0.38	0.22	1.5	1.78	2.42	4.26	10.46	13.32	15	20.12	23.2	17.72	14.96	11.58	14.3	15.44	12.8	12.94	19.26	15.5

Figure 9.3 25 Interactions with practical quizzes (checkpoints) by 2019_GE per student with time



	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Checkpoint 15	0.12	0.04	0.01	0.02	0.03	0.01	0.01	0.01	0.09	0.20	0.21	0.20	0.32	0.35	0.45	0.39	0.47	0.29	0.23	0.26	0.36	0.24	0.31	0.34
Checkpoint 14	0.12	0.12	0.03	0.05	0.00	0.00	0.00	0.05	0.26	0.34	0.25	0.69	1.27	1.31	1.18	1.08	0.95	1.14	0.84	0.58	1.86	1.03	0.75	0.57
Checkpoint 13	0.80	0.20	0.07	0.17	0.27	0.02	0.06	0.09	0.14	0.29	1.01	1.03	1.18	1.46	1.65	1.63	0.77	1.75	1.08	0.71	0.58	1.10	1.35	1.05
Checkpoint 12	0.26	0.22	0.08	0.23	0.19	0.16	0.01	0.11	0.07	0.97	2.12	2.02	2.47	1.79	2.01	1.11	2.12	1.71	0.95	1.12	0.98	1.38	1.24	0.86
Checkpoint 11	0.40	0.03	0.00	0.06	0.03	0.01	0.00	0.06	0.08	0.45	0.59	0.65	0.95	1.57	1.89	1.60	1.37	1.04	0.98	1.11	1.18	0.91	0.65	1.14
Checkpoint 10	0.23	0.09	0.27	0.24	0.02	0.02	0.01	0.03	0.18	0.42	1.62	1.68	2.21	1.47	1.86	1.79	1.69	0.90	0.89	0.76	0.87	1.55	1.31	1.06
Checkpoint 9	0.09	0.18	0.05	0.03	0.06	0.00	0.01	0.03	0.42	0.36	0.69	0.91	1.42	1.35	1.91	2.55	1.29	0.82	0.77	0.82	0.89	1.05	0.98	0.89
Checkpoint 8	0.34	0.20	0.08	0.08	0.05	0.03	0.01	0.04	0.29	0.72	1.91	2.74	2.92	2.36	2.56	2.80	1.83	1.47	1.49	0.85	1.60	0.69	1.05	0.91
Checkpoint 7	0.45	0.08	0.14	0.17	0.11	0.02	0.01	0.01	0.25	0.42	1.27	2.15	1.95	2.38	1.32	1.12	1.66	1.41	0.75	0.75	1.41	1.47	1.55	0.99
Checkpoint 6	0.35	0.22	0.04	0.01	0.00	0.01	0.01	0.02	0.15	0.59	2.58	1.87	2.04	1.78	1.83	2.53	1.68	1.23	0.88	0.74	0.79	1.18	1.26	0.76
Checkpoint 5	0.35	0.28	0.00	0.02	0.00	0.00	0.00	0.03	0.08	0.48	1.24	2.50	3.22	2.84	2.40	2.09	3.39	1.27	1.21	1.15	1.46	1.36	1.30	0.92
Checkpoint 4	0.17	0.35	0.16	0.03	0.00	0.00	0.01	0.08	0.09	0.90	2.55	3.27	2.90	3.34	2.76	3.43	2.50	1.91	0.91	0.80	0.80	1.51	1.43	0.53
Checkpoint 3	0.46	0.03	0.10	0.01	0.00	0.00	0.00	0.02	0.06	0.36	1.09	3.06	2.38	2.06	2.55	1.29	1.76	0.46	0.61	0.90	0.75	0.72	0.72	1.08
Checkpoint 2	0.61	0.17	0.08	0.02	0.00	0.02	0.00	0.08	0.13	0.84	2.28	3.08	2.76	2.89	2.11	2.08	1.12	0.89	0.40	0.69	1.02	1.06	0.80	1.15
Checkpoint 1	0.49	0.08	0.06	0.07	0.13	0.02	0.01	0.03	0.12	0.51	1.20	2.00	1.50	1.92	2.36	2.00	1.40	1.17	1.21	0.67	0.75	0.74	0.79	0.68
Total number if interactions	5.24	2.30	1.13	1.20	0.89	0.32	0.13	0.69	2.40	7.84	20.60	27.84	29.50	28.86	28.86	27.48	24.03	17.45	13.20	11.89	15.28	16.00	15.49	12.91

Figure 9.3 26 Interactions with practical quizzes (checkpoints) by 2019_U per student with time

Groups	Total Number of students	Assignment Extension	Online Structured Oral Examination Portal	Statement of Assessment Methods (SAM)
2018_F2F	100	0.14	0.00	6.25
2018_DE	11	2.82	4.00	10.82
2019_DE	38	0.95	1.89	5.92
2019_GE	50	0.38	0.56	5.04
2019_U	173	0.36	0.16	5.20

Table 11 IPS with external tools throughout the semester

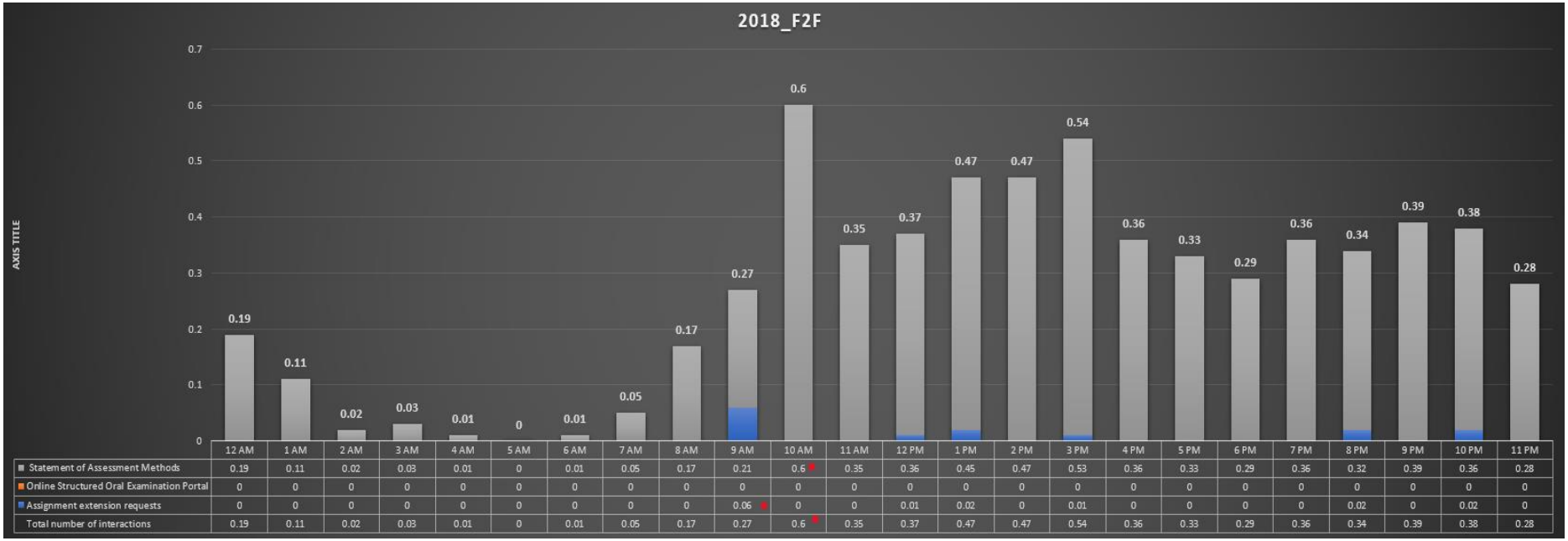
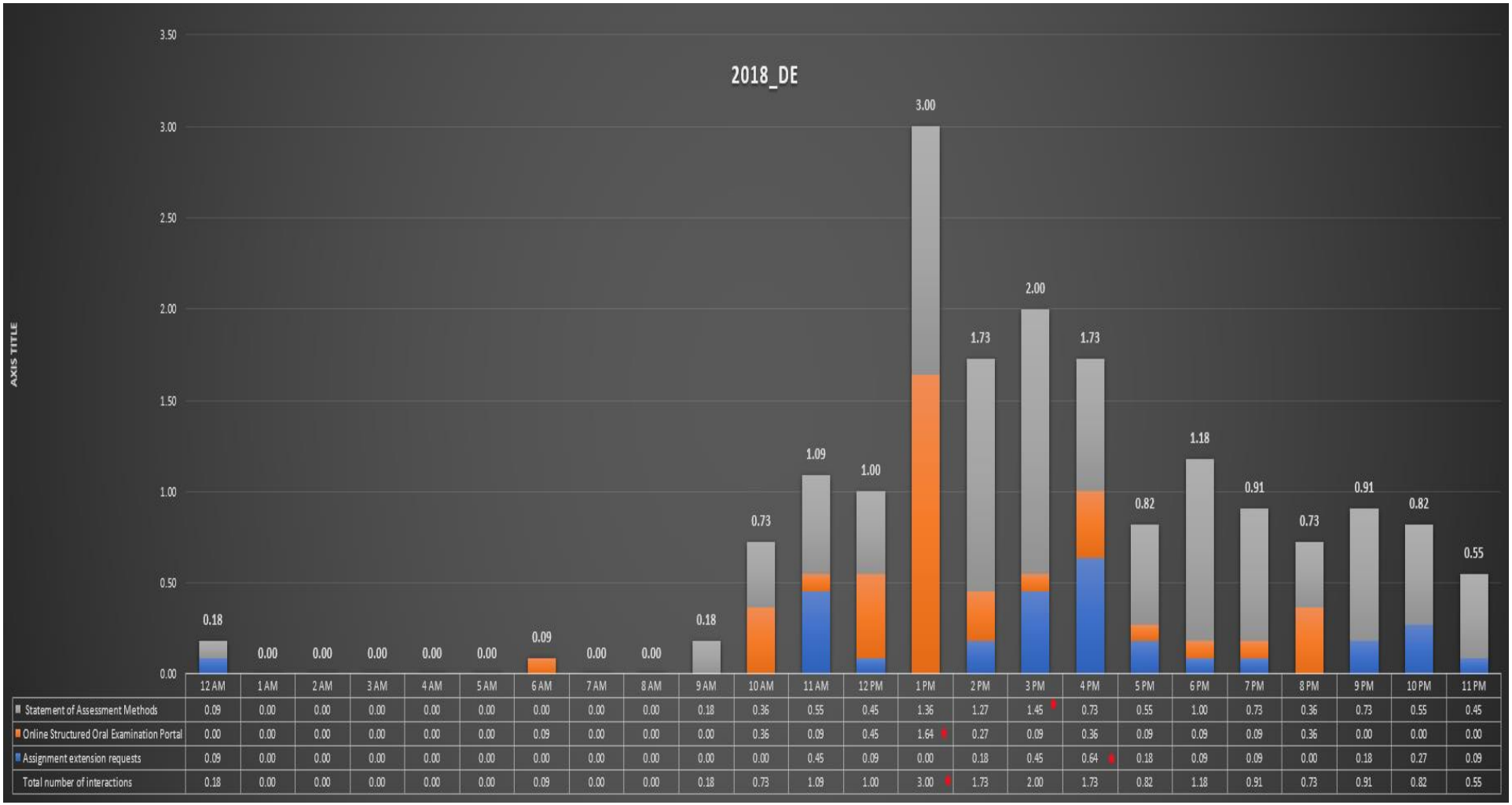


Figure 9.3 27 Interactions with external tools by 2018_F2F per student with time



	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Statement of Assessment Methods	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.36	0.55	0.45	1.36	1.27	1.45	0.73	0.55	1.00	0.73	0.36	0.73	0.55	0.45
Online Structured Oral Examination Portal	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.36	0.09	0.45	1.64	0.27	0.09	0.36	0.09	0.09	0.09	0.36	0.00	0.00	0.00
Assignment extension requests	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.09	0.00	0.18	0.45	0.64	0.18	0.09	0.09	0.00	0.18	0.27	0.09
Total number of interactions	0.18	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.18	0.73	1.09	1.00	3.00	1.73	2.00	1.73	0.82	1.18	0.91	0.73	0.91	0.82	0.55

Figure 9.3 28 Interactions with external tools by 2018_DE per student with time

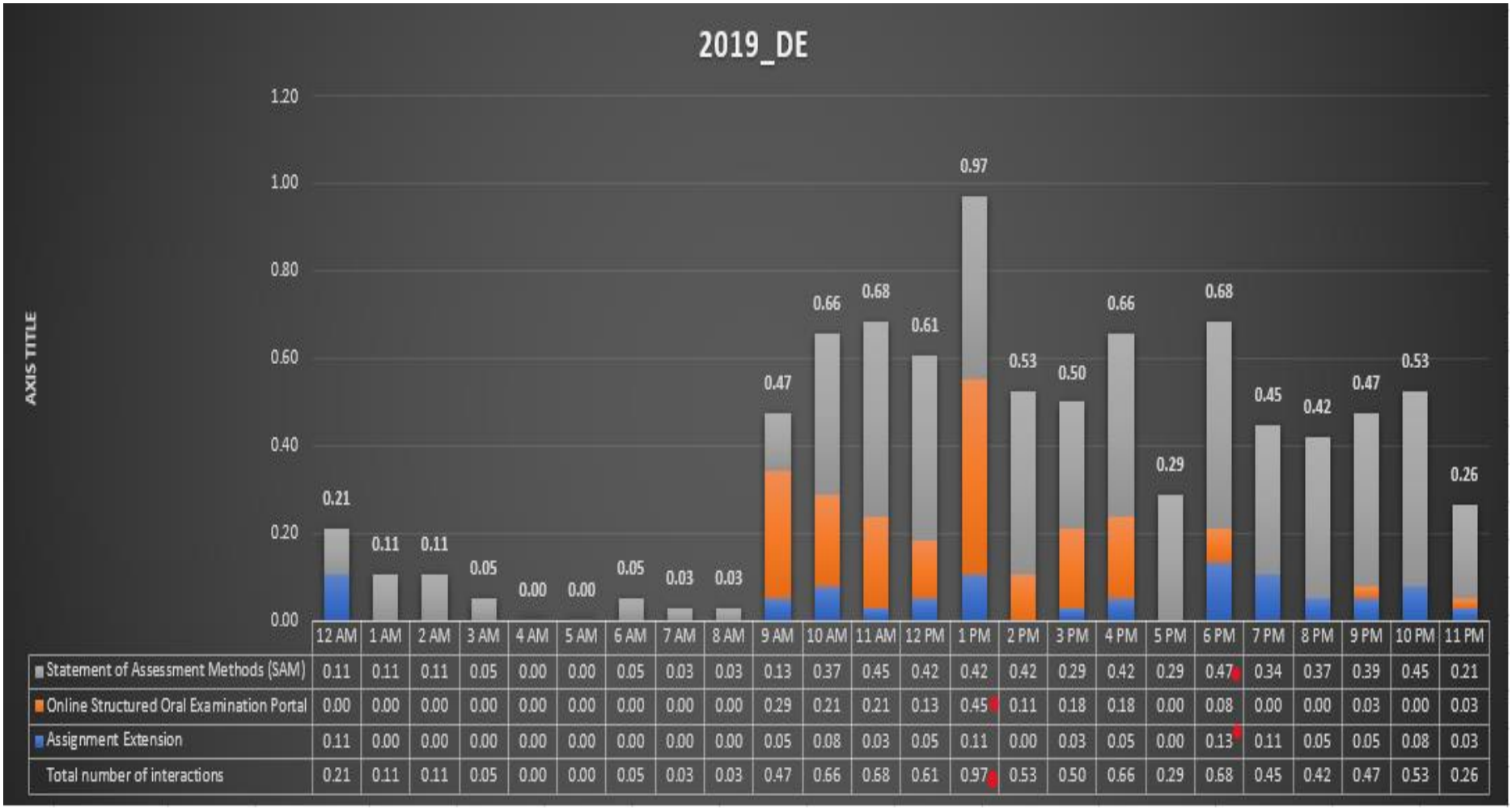
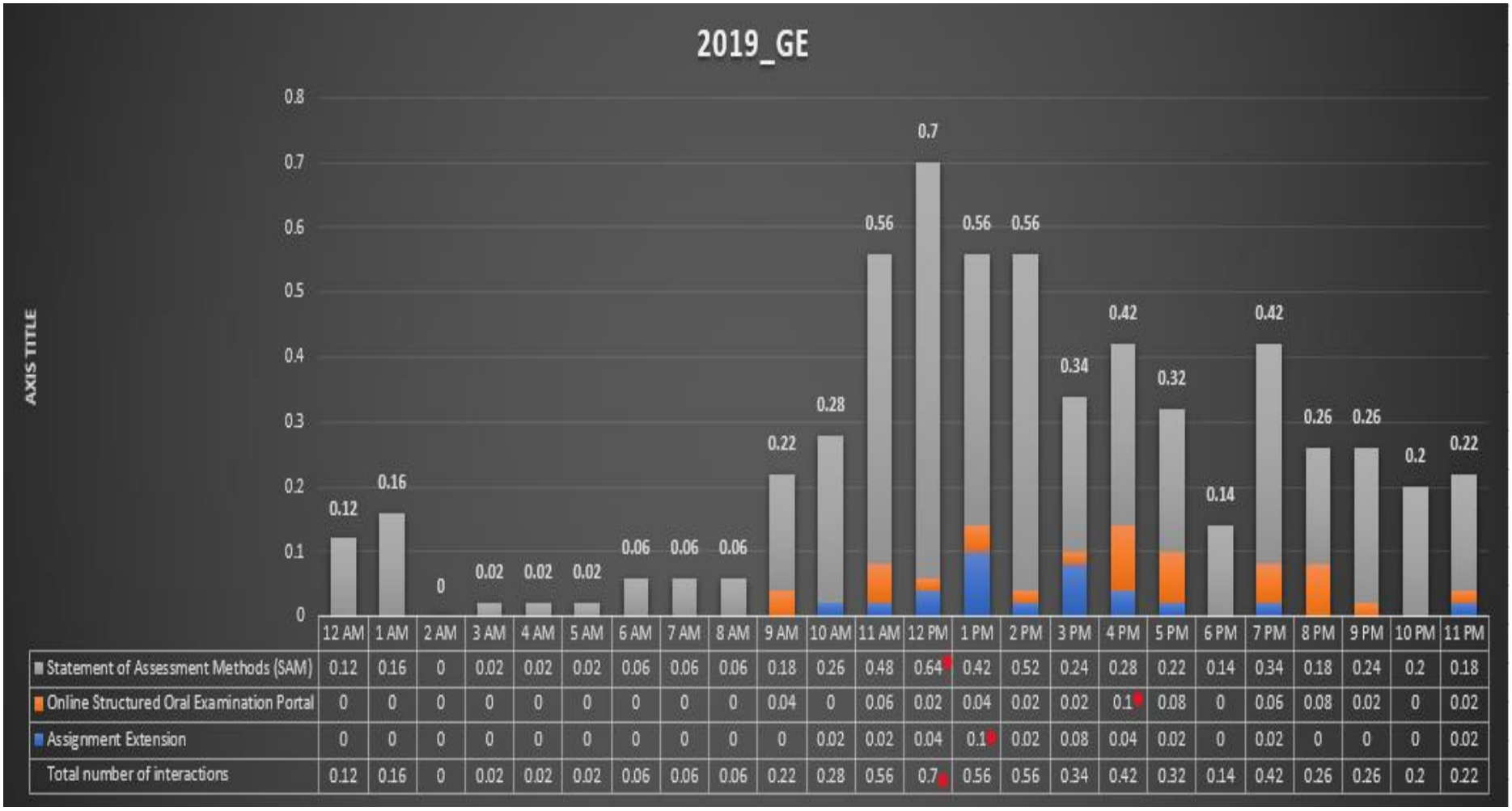
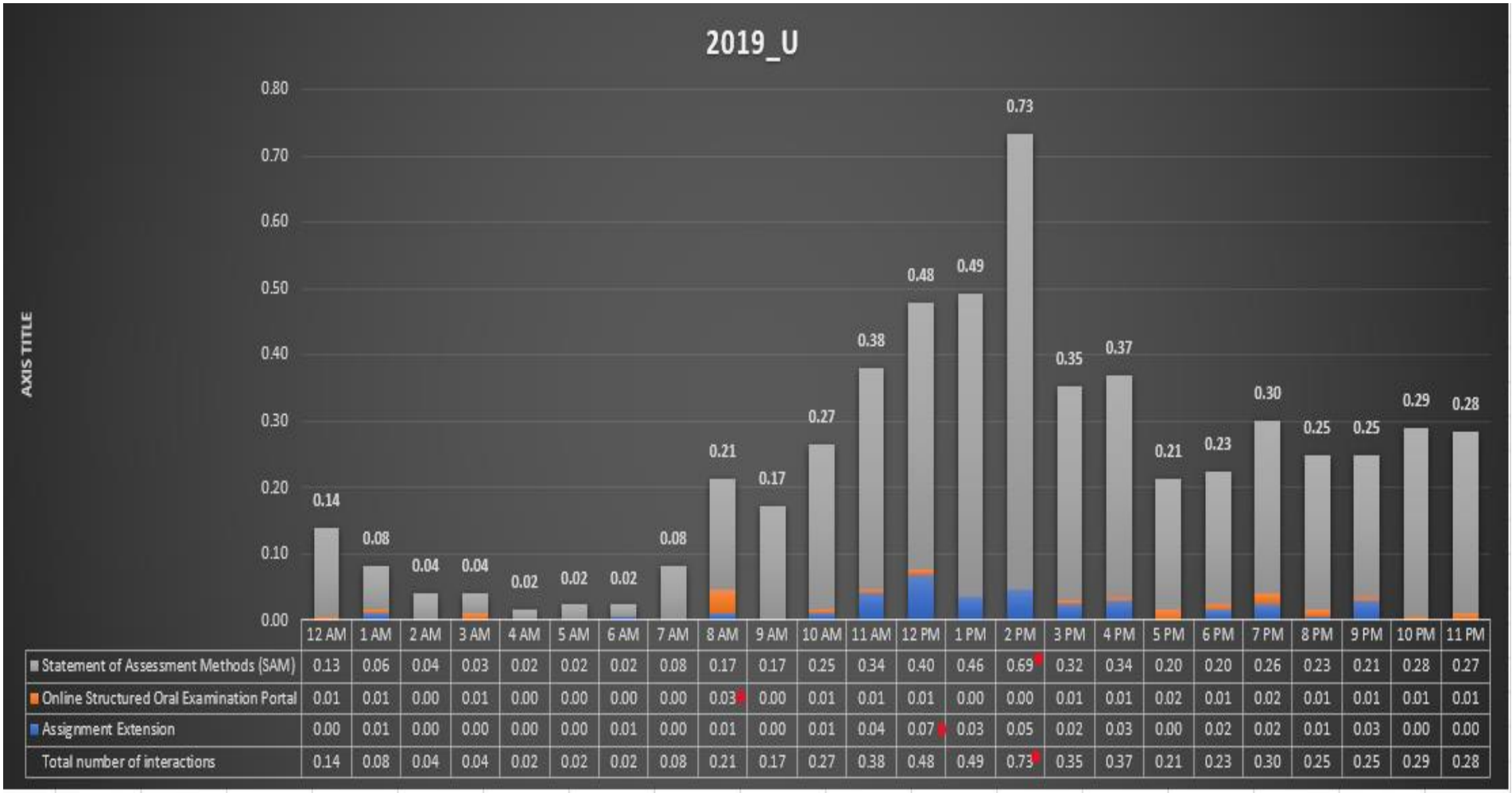


Figure 9.3 29 Interactions with external tools by 2019_DE per student with time



	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Statement of Assessment Methods (SAM)	0.12	0.16	0	0.02	0.02	0.02	0.06	0.06	0.06	0.18	0.26	0.48	0.64	0.42	0.52	0.24	0.28	0.22	0.14	0.34	0.18	0.24	0.2	0.18
Online Structured Oral Examination Portal	0	0	0	0	0	0	0	0	0	0.04	0	0.06	0.02	0.04	0.02	0.02	0.1	0.08	0	0.06	0.08	0.02	0	0.02
Assignment Extension	0	0	0	0	0	0	0	0	0	0	0.02	0.02	0.04	0.1	0.02	0.08	0.04	0.02	0	0.02	0	0	0	0.02
Total number of interactions	0.12	0.16	0	0.02	0.02	0.02	0.06	0.06	0.06	0.22	0.28	0.56	0.7	0.56	0.56	0.34	0.42	0.32	0.14	0.42	0.26	0.26	0.2	0.22

Figure 9.3 30 Interactions with external tools by 2019_GE per student with time

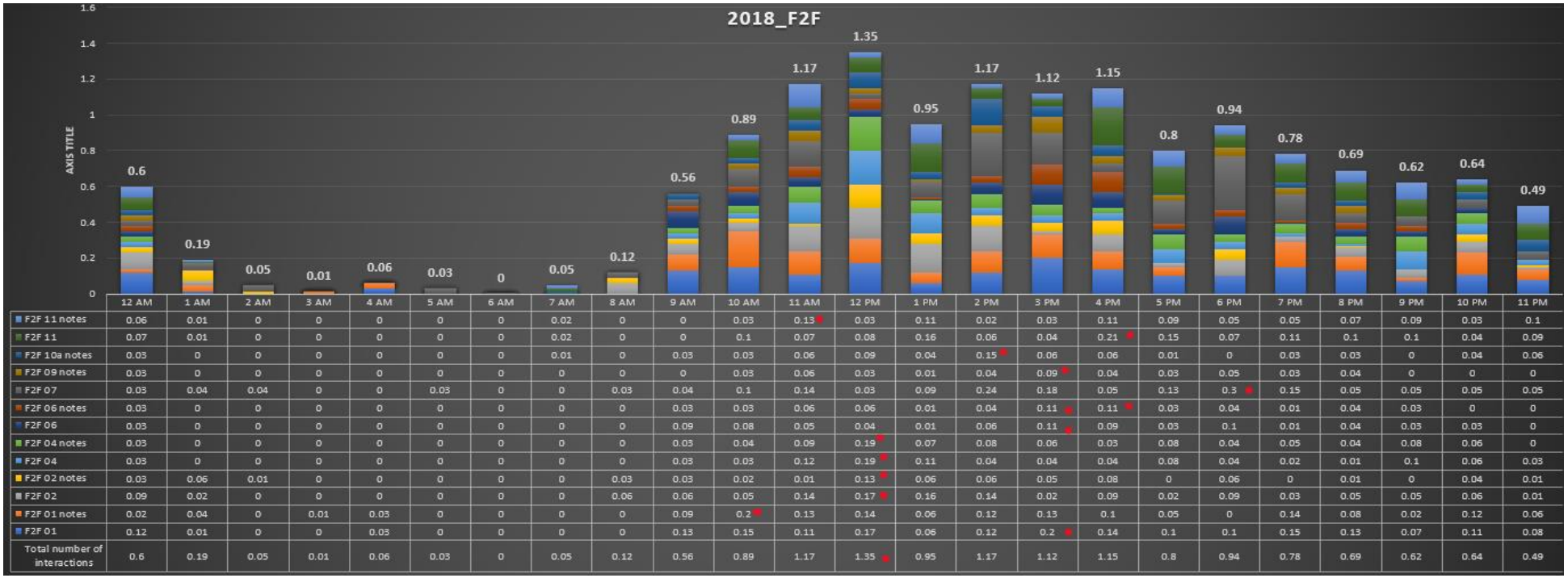


	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Statement of Assessment Methods (SAM)	0.13	0.06	0.04	0.03	0.02	0.02	0.02	0.08	0.17	0.17	0.25	0.34	0.40	0.46	0.69	0.32	0.34	0.20	0.20	0.26	0.23	0.21	0.28	0.27
Online Structured Oral Examination Portal	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.01
Assignment Extension	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.04	0.07	0.03	0.05	0.02	0.03	0.00	0.02	0.02	0.01	0.03	0.00	0.00
Total number of interactions	0.14	0.08	0.04	0.04	0.02	0.02	0.02	0.08	0.21	0.17	0.27	0.38	0.48	0.49	0.73	0.35	0.37	0.21	0.23	0.30	0.25	0.25	0.29	0.28

Figure 9.3 31 Interactions with external tools by 2019_U per student with time

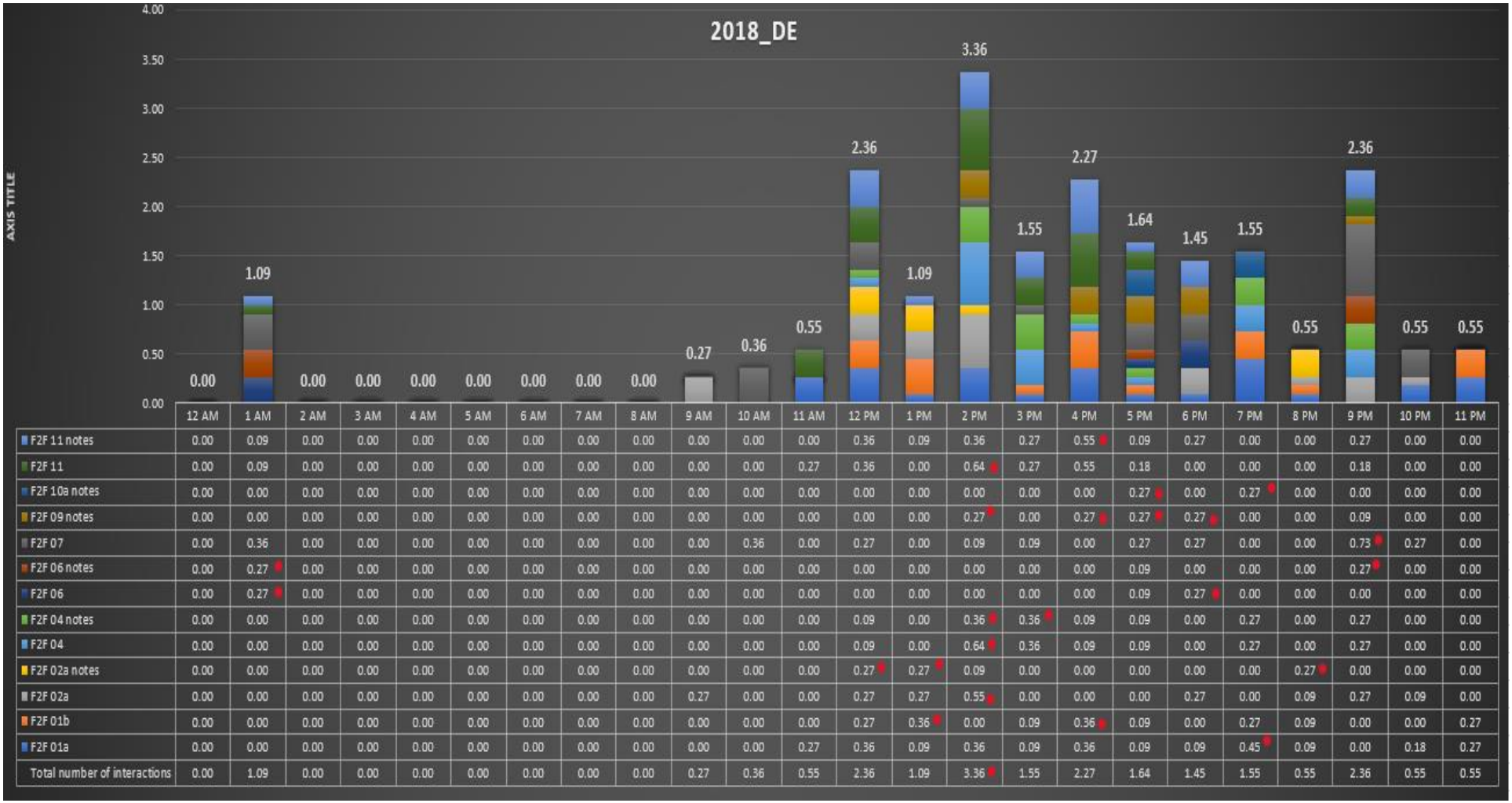
Groups	Total Number of students	F2F 01	F2F 01 notes	F2F 02	F2F 02 notes	F2F 03	F2F 03 notes	F2F 04	F2F 04 notes	F2F 06	F2F 06 notes	F2F 07	F2F 09 notes	F2F 10a notes	F2F 11	F2F 11 notes
2018_F2F	100	1.98	1.54	1.31	0.69	0.00	0.00	0.97	0.97	0.80	0.63	1.82	0.48	0.73	1.48	1.03
2018_DE	11	2.73	1.82	2.09	0.91	0.00	0.00	1.82	1.55	0.64	0.64	2.73	1.18	0.55	2.55	2.36
2019_DE	38	1.00	0.71	0.58	0.24	0.29	0.21	0.53	0.37	0.71	0.24	0.55	0.32	1.08	0.00	0.00
2019_GE	50	1.22	1.00	0.52	0.30	0.60	0.30	0.48	0.30	0.44	0.26	0.54	0.32	1.34	0.00	0.00
2019_U	173	0.72	0.52	0.23	0.14	0.39	0.13	0.45	0.21	0.26	0.12	0.35	0.11	0.57	0.00	0.00

Table 12 IPS with F2F notes throughout the semester



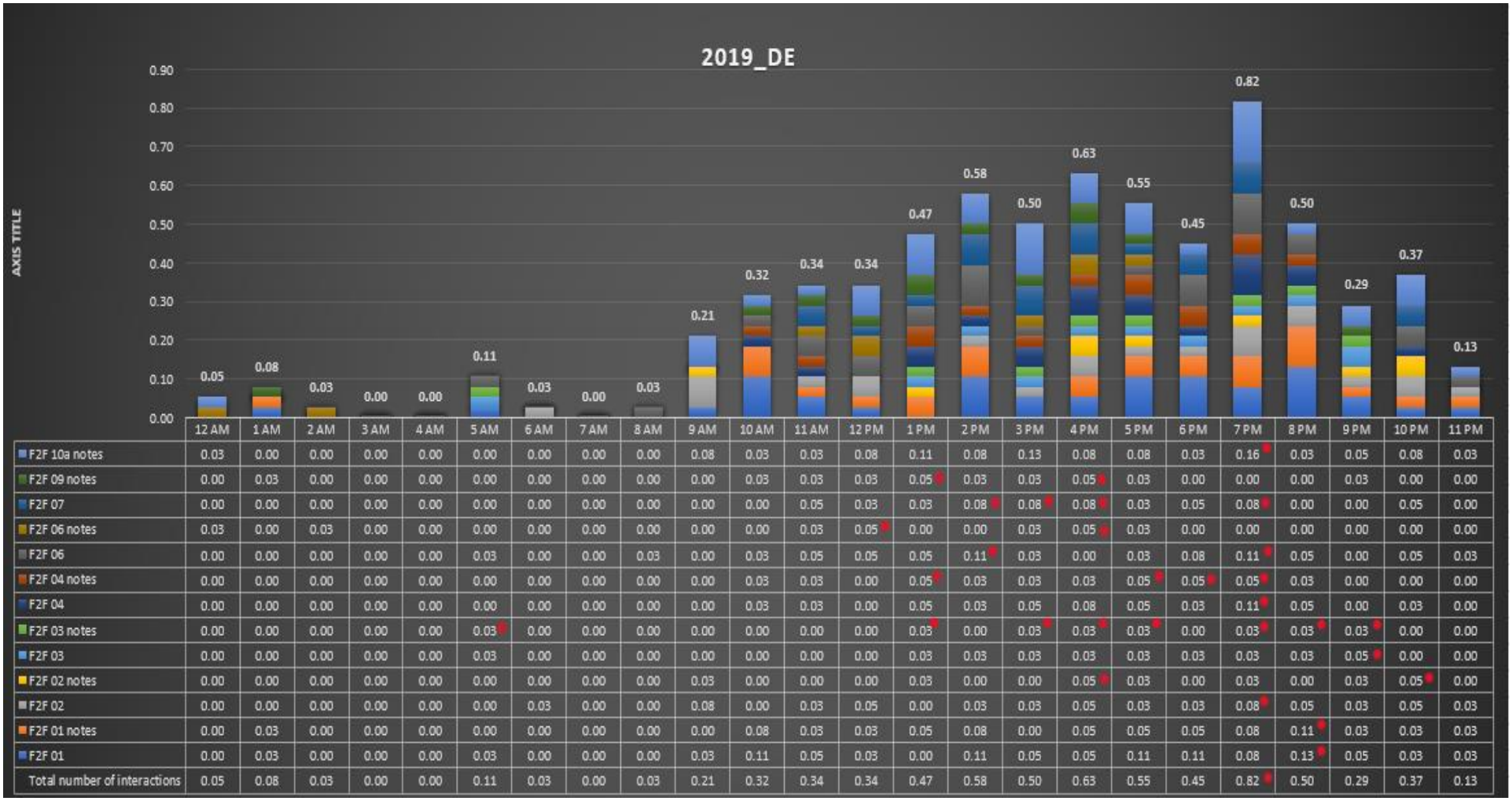
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
F2F 11 notes	0.06	0.01	0	0	0	0	0	0.02	0	0	0.03	0.13	0.03	0.11	0.02	0.03	0.11	0.09	0.05	0.05	0.07	0.09	0.03	0.1
F2F 11	0.07	0.01	0	0	0	0	0	0.02	0	0	0.1	0.07	0.08	0.16	0.06	0.04	0.21	0.15	0.07	0.11	0.1	0.1	0.04	0.09
F2F 10a notes	0.03	0	0	0	0	0	0	0.01	0	0.03	0.03	0.06	0.09	0.04	0.15	0.06	0.06	0.01	0	0.03	0.03	0	0.04	0.06
F2F 09 notes	0.03	0	0	0	0	0	0	0	0	0	0.03	0.06	0.03	0.01	0.04	0.09	0.04	0.03	0.05	0.03	0.04	0	0	0
F2F 07	0.03	0.04	0.04	0	0	0.03	0	0	0.03	0.04	0.1	0.14	0.03	0.09	0.24	0.18	0.05	0.13	0.3	0.15	0.05	0.05	0.05	0.05
F2F 06 notes	0.03	0	0	0	0	0	0	0	0	0.03	0.03	0.06	0.06	0.01	0.04	0.11	0.11	0.03	0.04	0.01	0.04	0.03	0	0
F2F 06	0.03	0	0	0	0	0	0	0	0	0.09	0.08	0.05	0.04	0.01	0.06	0.11	0.09	0.03	0.1	0.01	0.04	0.03	0.03	0
F2F 04 notes	0.03	0	0	0	0	0	0	0	0	0.03	0.04	0.09	0.19	0.07	0.08	0.06	0.03	0.08	0.04	0.05	0.04	0.08	0.06	0
F2F 04	0.03	0	0	0	0	0	0	0	0	0.03	0.03	0.12	0.19	0.11	0.04	0.04	0.04	0.08	0.04	0.02	0.01	0.1	0.06	0.03
F2F 02 notes	0.03	0.06	0.01	0	0	0	0	0	0.03	0.03	0.02	0.01	0.13	0.06	0.06	0.05	0.08	0	0.06	0	0.01	0	0.04	0.01
F2F 02	0.09	0.02	0	0	0	0	0	0	0.06	0.06	0.05	0.14	0.17	0.16	0.14	0.02	0.09	0.02	0.09	0.03	0.05	0.05	0.06	0.01
F2F 01 notes	0.02	0.04	0	0.01	0.03	0	0	0	0	0.09	0.2	0.13	0.14	0.06	0.12	0.13	0.1	0.05	0	0.14	0.08	0.02	0.12	0.06
F2F 01	0.12	0.01	0	0	0.03	0	0	0	0	0.13	0.15	0.11	0.17	0.06	0.12	0.2	0.14	0.1	0.1	0.15	0.13	0.07	0.11	0.08
Total number of interactions	0.6	0.19	0.05	0.01	0.06	0.03	0	0.05	0.12	0.56	0.89	1.17	1.35	0.95	1.17	1.12	1.15	0.8	0.94	0.78	0.69	0.62	0.64	0.49

Figure 9.3 32 Interactions with F2F notes by 2018_F2F per student with time



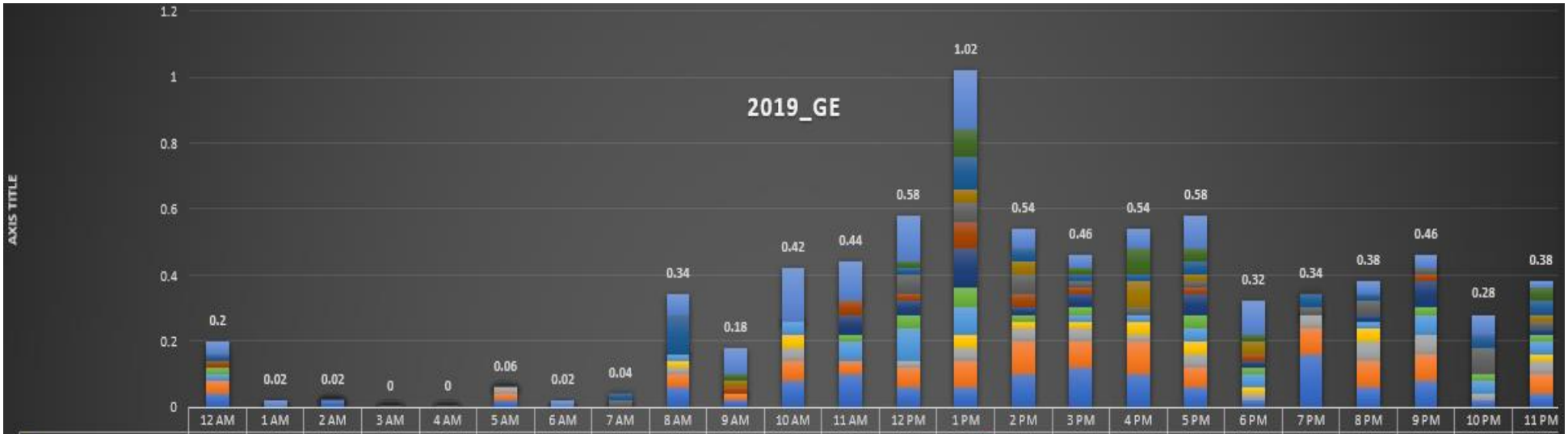
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
F2F 11 notes	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.09	0.36	0.27	0.55	0.09	0.27	0.00	0.00	0.27	0.00	0.00
F2F 11	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.36	0.00	0.64	0.27	0.55	0.18	0.00	0.00	0.00	0.18	0.00	0.00
F2F 10a notes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.27	0.00	0.00	0.00	0.00
F2F 09 notes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.27	0.27	0.27	0.00	0.00	0.09	0.00	0.00
F2F 07	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.27	0.00	0.09	0.09	0.00	0.27	0.27	0.00	0.00	0.73	0.27	0.00
F2F 06 notes	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.27	0.00	0.00
F2F 06	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.27	0.00	0.00	0.00	0.00	0.00
F2F 04 notes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.36	0.36	0.09	0.09	0.00	0.27	0.00	0.27	0.00	0.00
F2F 04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.64	0.36	0.09	0.09	0.00	0.27	0.00	0.27	0.00	0.00
F2F 02a notes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.27	0.09	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.00
F2F 02a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.27	0.27	0.55	0.00	0.00	0.00	0.27	0.00	0.09	0.27	0.09	0.00
F2F 01b	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.36	0.00	0.09	0.36	0.09	0.00	0.27	0.09	0.00	0.00	0.27
F2F 01a	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.36	0.09	0.36	0.09	0.36	0.09	0.09	0.45	0.09	0.00	0.18	0.27
Total number of interactions	0.00	1.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.36	0.55	2.36	1.09	3.36	1.55	2.27	1.64	1.45	1.55	0.55	2.36	0.55	0.55

Figure 9.3 33 Interactions with F2F notes by 2018_DE per student with time



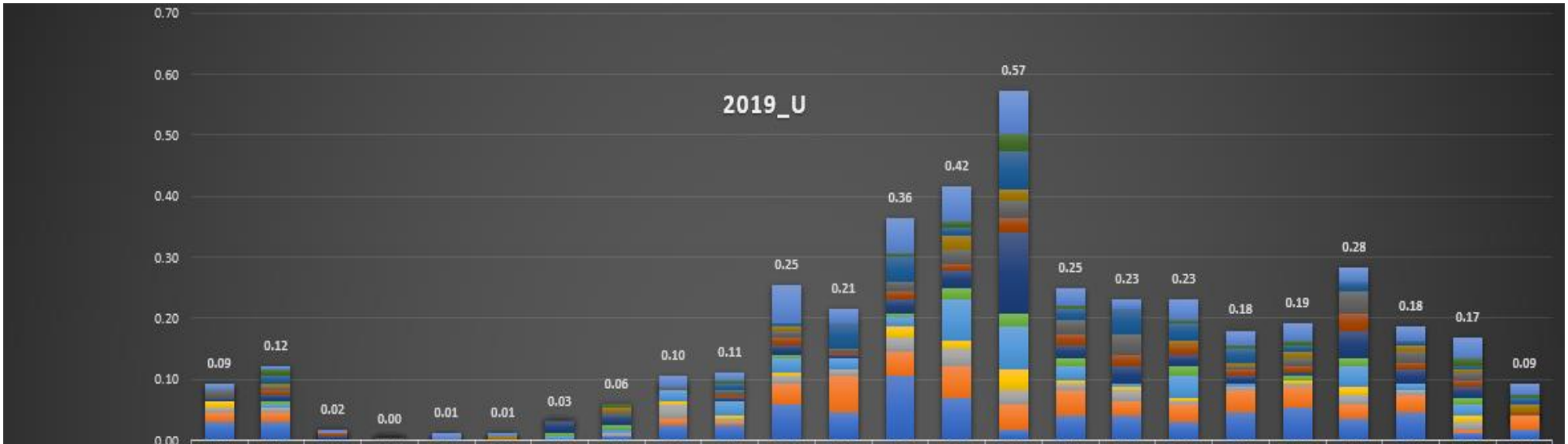
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
F2F 10a notes	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.03	0.03	0.08	0.11	0.08	0.13	0.08	0.08	0.03	0.16	0.03	0.05	0.08	0.03
F2F 09 notes	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.03	0.05	0.03	0.03	0.05	0.03	0.00	0.00	0.00	0.03	0.00	0.00
F2F 07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.03	0.03	0.08	0.08	0.08	0.03	0.05	0.08	0.00	0.00	0.05	0.00
F2F 06 notes	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.00	0.00	0.03	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00
F2F 06	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.03	0.00	0.03	0.05	0.05	0.05	0.11	0.03	0.00	0.03	0.08	0.11	0.05	0.00	0.05	0.03
F2F 04 notes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.05	0.03	0.03	0.03	0.05	0.05	0.05	0.03	0.00	0.00	0.00
F2F 04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.05	0.03	0.05	0.08	0.05	0.03	0.11	0.05	0.00	0.03	0.00
F2F 03 notes	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.03	0.03	0.00	0.03	0.03	0.03	0.00	0.00
F2F 03	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.05	0.00	0.00
F2F 02 notes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.00	0.05	0.03	0.00	0.03	0.00	0.03	0.05	0.00
F2F 02	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.08	0.00	0.03	0.05	0.00	0.03	0.03	0.05	0.03	0.03	0.08	0.05	0.03	0.05	0.03
F2F 01 notes	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.03	0.03	0.05	0.08	0.00	0.05	0.05	0.05	0.08	0.11	0.03	0.03	0.03
F2F 01	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.03	0.11	0.05	0.03	0.00	0.11	0.05	0.05	0.11	0.11	0.08	0.13	0.05	0.03	0.03
Total number of interactions	0.05	0.08	0.03	0.00	0.00	0.11	0.03	0.00	0.03	0.21	0.32	0.34	0.34	0.47	0.58	0.50	0.63	0.55	0.45	0.82	0.50	0.29	0.37	0.13

Figure 9.3 34 Interactions with F2F notes by 2019_DE per student with time



	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
F2F 10a notes	0.04	0.02	0	0	0	0	0.02	0	0.06	0.08	0.16	0.12	0.14	0.18	0.06	0.04	0.06	0.1	0.1	0	0.04	0.04	0.06	0.02
F2F 09 notes	0	0	0	0	0	0	0	0	0	0.02	0	0	0.02	0.08	0	0.02	0.08	0.04	0.02	0	0	0	0	0.04
F2F 07	0.02	0	0	0	0	0	0	0.02	0.12	0	0	0	0.02	0.1	0.04	0.02	0.02	0.04	0	0.04	0.02	0	0.04	0.04
F2F 06 notes	0	0	0	0	0	0	0	0	0	0.02	0	0	0	0.04	0.04	0	0.08	0.02	0.04	0	0	0	0	0.02
F2F 06	0	0	0	0	0	0	0	0.02	0	0	0	0	0.06	0.06	0.06	0.02	0.02	0.02	0	0.02	0.04	0.02	0.08	0.02
F2F 04 notes	0.02	0	0	0	0	0	0	0	0	0.02	0	0.04	0.02	0.08	0.04	0.02	0	0.02	0.02	0	0	0.02	0	0
F2F 04	0	0	0	0	0	0	0	0	0	0	0	0.06	0.04	0.12	0.02	0.04	0	0.06	0.02	0	0.02	0.08	0	0.02
F2F 03 notes	0.02	0	0	0	0	0	0	0	0	0	0	0.02	0.04	0.06	0.02	0.02	0	0.04	0.02	0	0	0.02	0.02	0.02
F2F 03	0.02	0	0	0	0	0	0	0	0.02	0	0.04	0.06	0.1	0.08	0	0.02	0.02	0.04	0.04	0	0.02	0.06	0.04	0.04
F2F 02 notes	0	0	0	0	0	0	0	0	0.02	0	0.04	0	0	0.04	0.02	0.02	0.04	0.04	0.02	0	0.04	0	0	0.02
F2F 02	0	0	0	0	0	0.02	0	0	0.02	0	0.04	0	0.02	0.04	0.04	0.04	0.02	0.04	0.02	0.04	0.06	0.06	0.02	0.04
F2F 01 notes	0.04	0	0	0	0	0.02	0	0	0.04	0.02	0.06	0.04	0.06	0.08	0.1	0.08	0.1	0.06	0	0.08	0.08	0.08	0	0.06
F2F 01	0.04	0	0.02	0	0	0.02	0	0	0.06	0.02	0.08	0.1	0.06	0.06	0.1	0.12	0.1	0.06	0.02	0.16	0.06	0.08	0.02	0.04
Total number of interactions	0.2	0.02	0.02	0	0	0.06	0.02	0.04	0.34	0.18	0.42	0.44	0.58	1.02	0.54	0.46	0.54	0.58	0.32	0.34	0.38	0.46	0.28	0.38

Figure 9.3 35 Interactions with F2F notes by 2019_GE per student with time

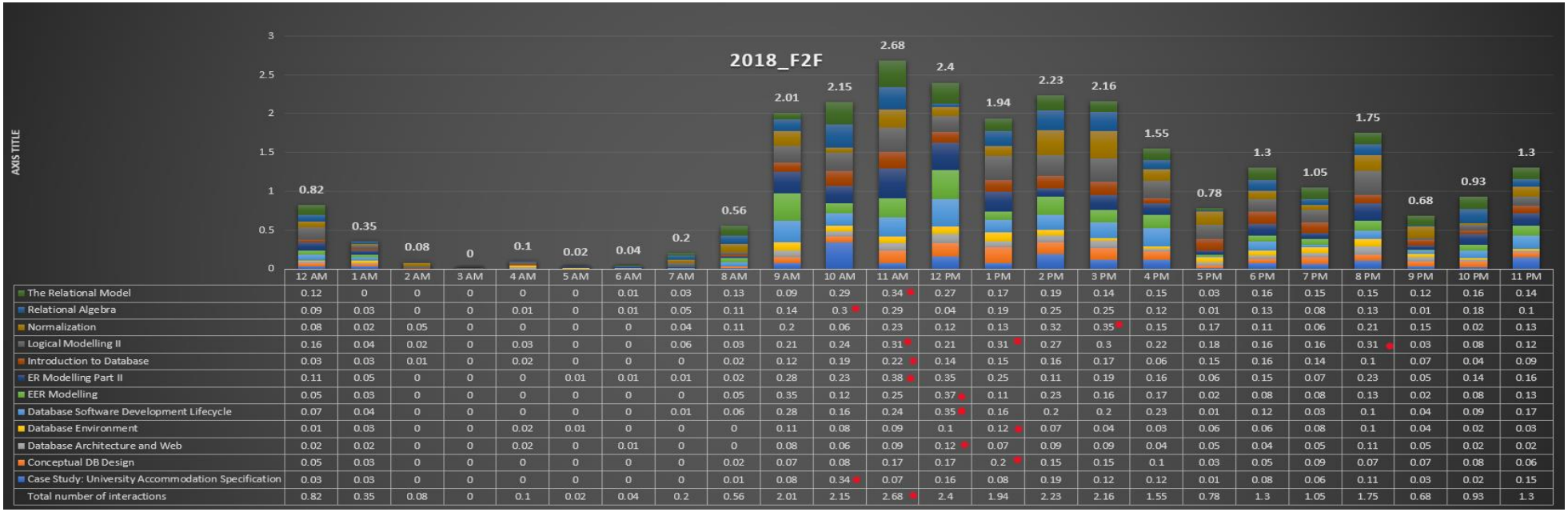


	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
F2F 10a notes	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.02	0.01	0.06	0.02	0.06	0.06	0.07	0.03	0.02	0.03	0.02	0.03	0.02	0.02	0.03	0.02
F2F 09 notes	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.03	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.01
F2F 07	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.04	0.04	0.01	0.06	0.02	0.04	0.03	0.02	0.01	0.02	0.01	0.01	0.01
F2F 06 notes	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01
F2F 06	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.02	0.03	0.00	0.01	0.01	0.03	0.02	0.01	0.00
F2F 04 notes	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.03	0.01	0.01	0.01
F2F 04	0.01	0.01	0.01	0.00	0.00	0.00	0.02	0.02	0.00	0.01	0.02	0.01	0.02	0.03	0.13	0.02	0.03	0.02	0.01	0.01	0.05	0.02	0.02	0.00
F2F 03 notes	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.02	0.02	0.01	0.00	0.02	0.00	0.01	0.01	0.00	0.01	0.00
F2F 03	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.07	0.07	0.02	0.01	0.03	0.01	0.00	0.03	0.01	0.02	0.00
F2F 02 notes	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.02	0.01	0.03	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.00
F2F 02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.01	0.01	0.02	0.03	0.02	0.01	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.00
F2F 01 notes	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.06	0.04	0.05	0.04	0.04	0.02	0.03	0.03	0.03	0.02	0.03	0.01	0.02
F2F 01	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.06	0.05	0.10	0.07	0.02	0.04	0.04	0.03	0.05	0.05	0.03	0.05	0.01	0.02
Total number of interactions	0.09	0.12	0.02	0.00	0.01	0.01	0.03	0.06	0.10	0.11	0.25	0.21	0.36	0.42	0.57	0.25	0.23	0.23	0.18	0.19	0.28	0.18	0.17	0.09

Figure 9.3 36 Interactions with F2F notes by 2019_U per student with time

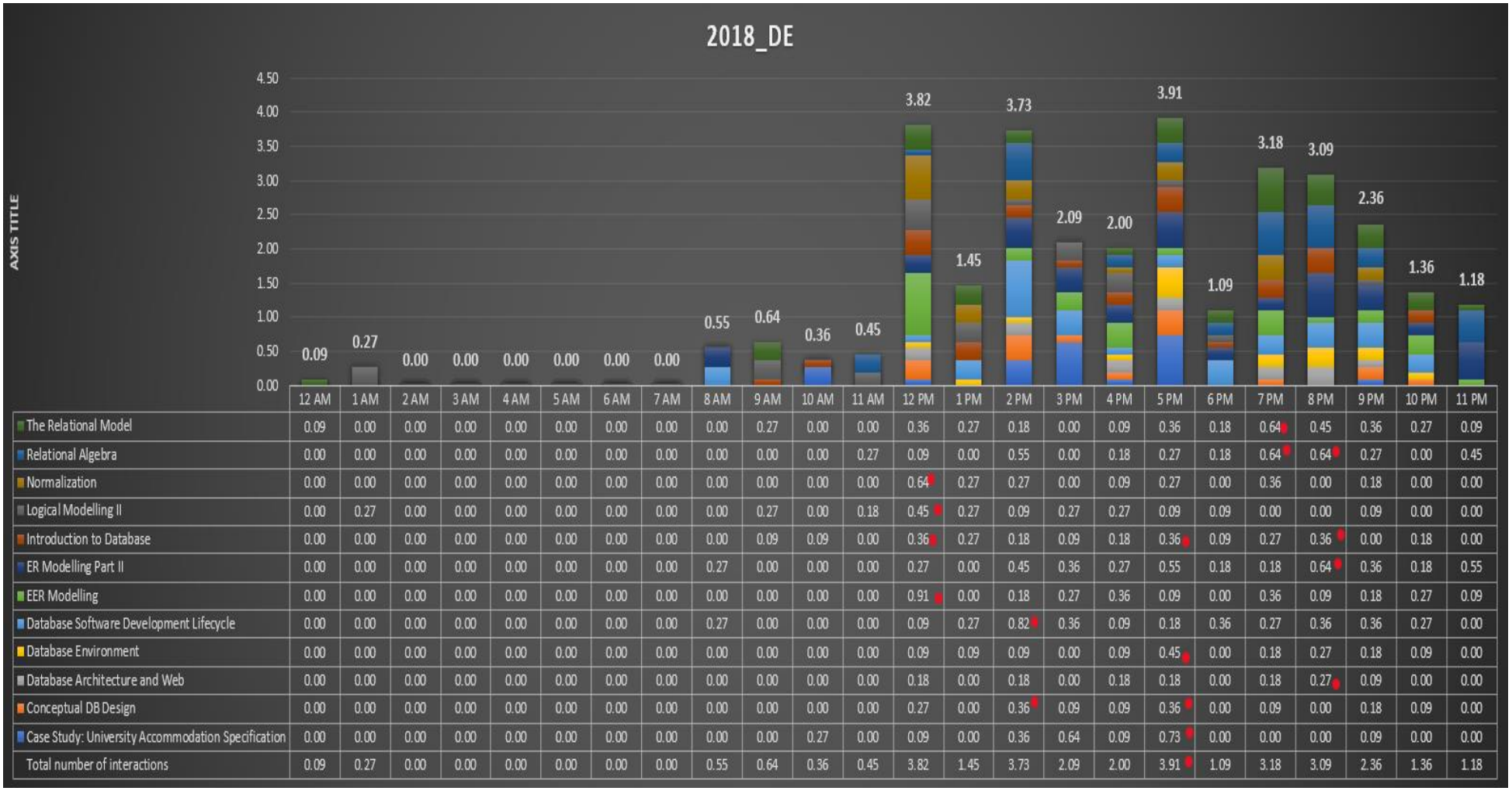
Groups	Total Number of students	Case Study: University Accommodation Specification	Conceptual DB Design	Database Architecture and Web	Database Environment	Database Software Development Lifecycle	EER Modelling	ER Modelling Part II	Introduction to Database	Logical Modelling II	Normalization	Relational Algebra	The Relational Model
2018_F2F	100	1.69	1.64	1.05	1.10	2.56	2.43	3.02	2.07	3.45	2.71	2.52	2.84
2018_DE	11	2.27	1.55	1.27	1.55	3.73	2.82	4.27	2.55	2.36	2.09	3.55	3.64
2019_DE	38	1.76	1.13	1.13	1.24	1.08	1.29	1.92	1.89	2.13	1.34	1.05	0.00
2019_GE	50	1.82	1.78	1.28	1.52	1.74	1.98	2.66	2.50	3.28	1.72	1.16	0.00
2019_U	173	1.40	1.03	1.12	1.12	0.84	1.29	1.70	1.91	1.97	1.50	1.05	0.00

Table 13 IPS with theoretical course material's chapter pdfs



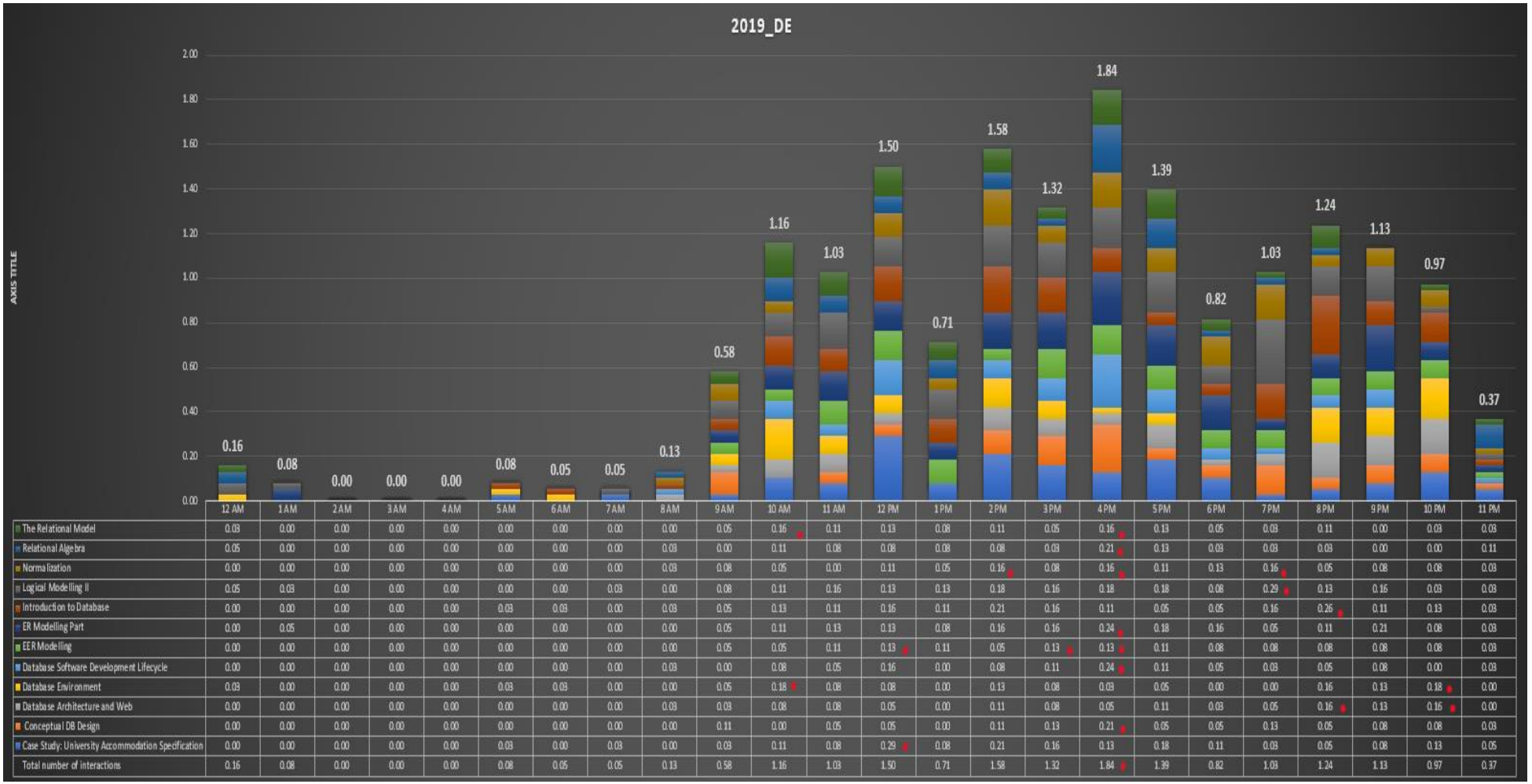
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
The Relational Model	0.12	0	0	0	0	0	0.01	0.03	0.13	0.09	0.29	0.34	0.27	0.17	0.19	0.14	0.15	0.03	0.16	0.15	0.15	0.12	0.16	0.14
Relational Algebra	0.09	0.03	0	0	0.01	0	0.01	0.05	0.11	0.14	0.3	0.29	0.04	0.19	0.25	0.25	0.12	0.01	0.13	0.08	0.13	0.01	0.18	0.1
Normalization	0.08	0.02	0.05	0	0	0	0	0.04	0.11	0.2	0.06	0.23	0.12	0.13	0.32	0.35	0.15	0.17	0.11	0.06	0.21	0.15	0.02	0.13
Logical Modelling II	0.16	0.04	0.02	0	0.03	0	0	0.06	0.03	0.21	0.24	0.31	0.21	0.31	0.27	0.3	0.22	0.18	0.16	0.16	0.31	0.03	0.08	0.12
Introduction to Database	0.03	0.03	0.01	0	0.02	0	0	0	0.02	0.12	0.19	0.22	0.14	0.15	0.16	0.17	0.06	0.15	0.16	0.14	0.1	0.07	0.04	0.09
ER Modelling Part II	0.11	0.05	0	0	0	0.01	0.01	0.01	0.02	0.28	0.23	0.38	0.35	0.25	0.11	0.19	0.16	0.06	0.15	0.07	0.23	0.05	0.14	0.16
EER Modelling	0.05	0.03	0	0	0	0	0	0	0.05	0.35	0.12	0.25	0.37	0.11	0.23	0.16	0.17	0.02	0.08	0.08	0.13	0.02	0.08	0.13
Database Software Development Lifecycle	0.07	0.04	0	0	0	0	0	0.01	0.06	0.28	0.16	0.24	0.35	0.16	0.2	0.2	0.23	0.01	0.12	0.03	0.1	0.04	0.09	0.17
Database Environment	0.01	0.03	0	0	0.02	0.01	0	0	0	0.11	0.08	0.09	0.1	0.12	0.07	0.04	0.03	0.06	0.06	0.08	0.1	0.04	0.02	0.03
Database Architecture and Web	0.02	0.02	0	0	0.02	0	0.01	0	0	0.08	0.06	0.09	0.12	0.07	0.09	0.09	0.04	0.05	0.04	0.05	0.11	0.05	0.02	0.02
Conceptual DB Design	0.05	0.03	0	0	0	0	0	0	0.02	0.07	0.08	0.17	0.17	0.2	0.15	0.15	0.1	0.03	0.05	0.09	0.07	0.07	0.08	0.06
Case Study: University Accommodation Specification	0.03	0.03	0	0	0	0	0	0	0.01	0.08	0.34	0.07	0.16	0.08	0.19	0.12	0.12	0.01	0.08	0.06	0.11	0.03	0.02	0.15
Total number of interactions	0.82	0.35	0.08	0	0.1	0.02	0.04	0.2	0.56	2.01	2.15	2.68	2.4	1.94	2.23	2.16	1.55	0.78	1.3	1.05	1.75	0.68	0.93	1.3

Figure 9.3 37 Interactions with theoretical course material's chapter PDFs by 2018_F2F per student with time



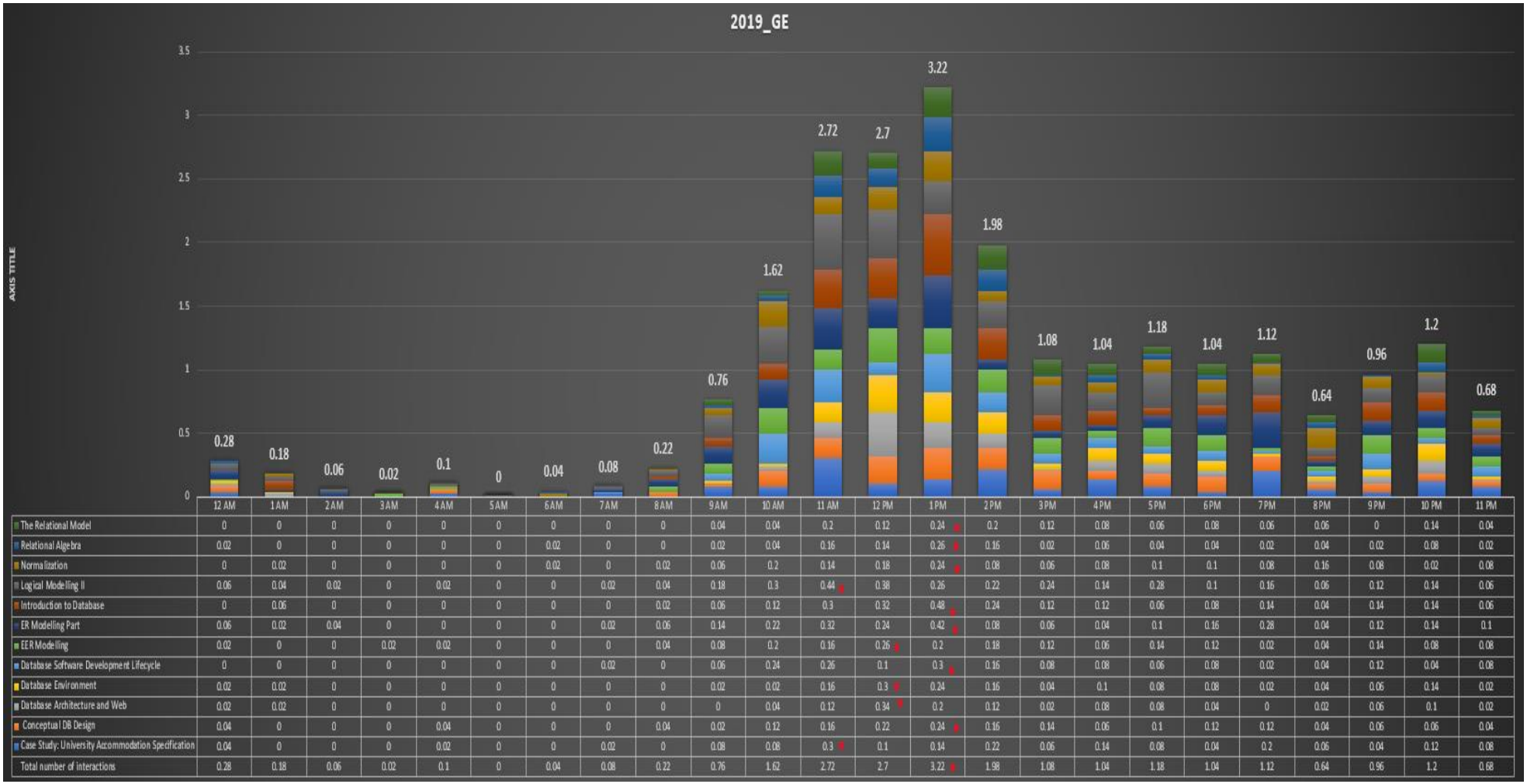
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
The Relational Model	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.36	0.27	0.18	0.00	0.09	0.36	0.18	0.64	0.45	0.36	0.27	0.09
Relational Algebra	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.09	0.00	0.55	0.00	0.18	0.27	0.18	0.64	0.64	0.27	0.00	0.45
Normalization	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.27	0.27	0.00	0.09	0.27	0.00	0.36	0.00	0.18	0.00	0.00
Logical Modelling II	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.18	0.45	0.27	0.09	0.27	0.27	0.09	0.09	0.00	0.00	0.09	0.00	0.00
Introduction to Database	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.00	0.36	0.27	0.18	0.09	0.18	0.36	0.09	0.27	0.36	0.00	0.18	0.00
ER Modelling Part II	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.27	0.00	0.45	0.36	0.27	0.55	0.18	0.18	0.64	0.36	0.18	0.55
EER Modelling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91	0.00	0.18	0.27	0.36	0.09	0.00	0.36	0.09	0.18	0.27	0.09
Database Software Development Lifecycle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.09	0.27	0.82	0.36	0.09	0.18	0.36	0.27	0.36	0.36	0.27	0.00
Database Environment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.09	0.00	0.09	0.45	0.00	0.18	0.27	0.18	0.09	0.00
Database Architecture and Web	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.18	0.00	0.18	0.18	0.00	0.18	0.27	0.09	0.00	0.00
Conceptual DB Design	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.36	0.09	0.09	0.36	0.00	0.09	0.00	0.18	0.09	0.00
Case Study: University Accommodation Specification	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.09	0.00	0.36	0.64	0.09	0.73	0.00	0.00	0.00	0.09	0.00	0.00
Total number of interactions	0.09	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.64	0.36	0.45	3.82	1.45	3.73	2.09	2.00	3.91	1.09	3.18	3.09	2.36	1.36	1.18

Figure 9.3 38 Interactions with theoretical course material's chapter PDFs by 2018_DE per student with time



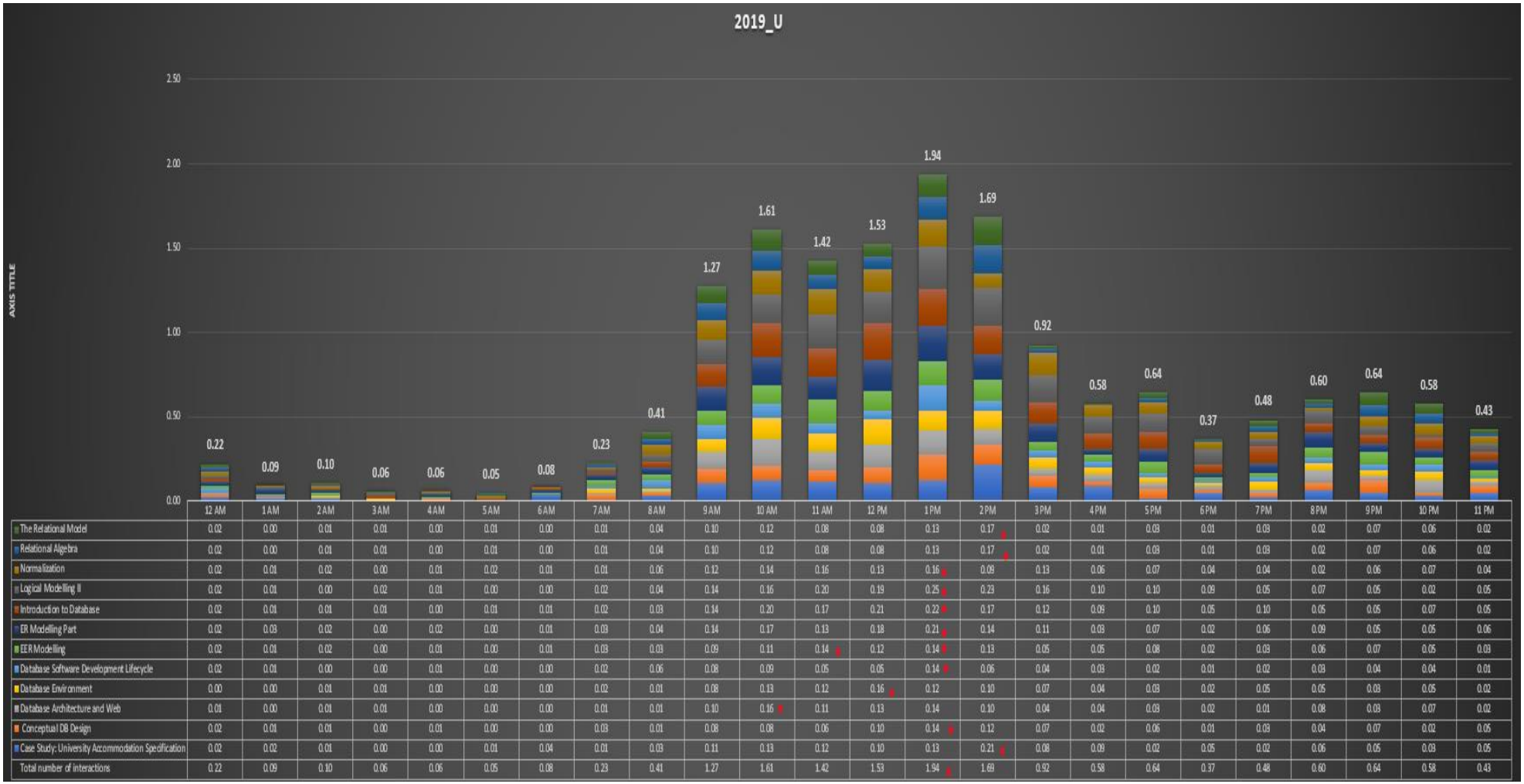
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
The Relational Model	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.16	0.11	0.13	0.08	0.11	0.05	0.16	0.13	0.05	0.03	0.11	0.00	0.03	0.03
Relational Algebra	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.11	0.08	0.08	0.08	0.08	0.03	0.21	0.13	0.03	0.03	0.03	0.00	0.00	0.11
Normalization	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.08	0.05	0.00	0.11	0.05	0.16	0.08	0.16	0.11	0.13	0.16	0.05	0.08	0.08	0.03
Logical Modelling II	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.08	0.11	0.16	0.13	0.13	0.18	0.16	0.18	0.18	0.08	0.29	0.13	0.16	0.03	0.03
Introduction to Database	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.03	0.05	0.13	0.11	0.16	0.11	0.21	0.16	0.11	0.05	0.05	0.16	0.26	0.11	0.13	0.03
ER Modelling Part	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.11	0.13	0.13	0.08	0.16	0.16	0.24	0.18	0.16	0.05	0.11	0.21	0.08	0.03
EER Modelling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.11	0.13	0.11	0.05	0.13	0.13	0.11	0.08	0.08	0.08	0.08	0.08	0.03
Database Software Development Lifecycle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.08	0.05	0.16	0.00	0.08	0.11	0.24	0.11	0.05	0.03	0.05	0.08	0.00	0.03
Database Environment	0.03	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.05	0.18	0.08	0.08	0.00	0.13	0.08	0.03	0.05	0.00	0.00	0.16	0.13	0.18	0.00
Database Architecture and Web	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.08	0.08	0.05	0.00	0.11	0.08	0.05	0.11	0.03	0.05	0.16	0.13	0.16	0.00
Conceptual DB Design	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.05	0.05	0.00	0.11	0.13	0.21	0.05	0.05	0.13	0.05	0.08	0.08	0.03
Case Study: University Accommodation Specification	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.03	0.11	0.08	0.29	0.08	0.21	0.16	0.13	0.18	0.11	0.03	0.05	0.08	0.13	0.05
Total number of interactions	0.16	0.08	0.00	0.00	0.00	0.08	0.05	0.05	0.13	0.58	1.16	1.03	1.50	0.71	1.58	1.32	1.84	1.39	0.82	1.03	1.24	1.13	0.97	0.37

Figure 9.3 39 Interactions with theoretical course material's chapter PDFs by 2019_DE per student with time



	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
The Relational Model	0	0	0	0	0	0	0	0	0	0.04	0.04	0.2	0.12	0.24	0.2	0.12	0.08	0.06	0.08	0.06	0.06	0	0.14	0.04
Relational Algebra	0.02	0	0	0	0	0	0.02	0	0	0.02	0.04	0.16	0.14	0.26	0.16	0.02	0.06	0.04	0.04	0.02	0.04	0.02	0.08	0.02
Normalization	0	0.02	0	0	0	0	0.02	0	0.02	0.06	0.2	0.14	0.18	0.24	0.08	0.06	0.08	0.1	0.1	0.08	0.16	0.08	0.02	0.08
Logical Modelling II	0.06	0.04	0.02	0	0.02	0	0	0.02	0.04	0.18	0.3	0.44	0.38	0.26	0.22	0.24	0.14	0.28	0.1	0.16	0.06	0.12	0.14	0.06
Introduction to Database	0	0.06	0	0	0	0	0	0	0.02	0.06	0.12	0.3	0.32	0.48	0.24	0.12	0.12	0.06	0.08	0.14	0.04	0.14	0.14	0.06
ER Modelling Part	0.06	0.02	0.04	0	0	0	0	0.02	0.06	0.14	0.22	0.32	0.24	0.42	0.08	0.06	0.04	0.1	0.16	0.28	0.04	0.12	0.14	0.1
EER Modelling	0.02	0	0	0.02	0.02	0	0	0	0.04	0.08	0.2	0.16	0.26	0.2	0.18	0.12	0.06	0.14	0.12	0.02	0.04	0.14	0.08	0.08
Database Software Development Lifecycle	0	0	0	0	0	0	0	0.02	0	0.06	0.24	0.26	0.1	0.3	0.16	0.08	0.08	0.06	0.08	0.02	0.04	0.12	0.04	0.08
Database Environment	0.02	0.02	0	0	0	0	0	0	0	0.02	0.02	0.16	0.3	0.24	0.16	0.04	0.1	0.08	0.08	0.02	0.04	0.06	0.14	0.02
Database Architecture and Web	0.02	0.02	0	0	0	0	0	0	0	0	0.04	0.12	0.34	0.2	0.12	0.02	0.08	0.08	0.04	0	0.02	0.06	0.1	0.02
Conceptual DB Design	0.04	0	0	0	0.04	0	0	0	0.04	0.02	0.12	0.16	0.22	0.24	0.16	0.14	0.06	0.1	0.12	0.12	0.04	0.06	0.06	0.04
Case Study: University Accommodation Specification	0.04	0	0	0	0.02	0	0	0.02	0	0.08	0.08	0.3	0.1	0.14	0.22	0.06	0.14	0.08	0.04	0.2	0.06	0.04	0.12	0.08
Total number of interactions	0.28	0.18	0.06	0.02	0.1	0	0.04	0.08	0.22	0.76	1.62	2.72	2.7	3.22	1.98	1.08	1.04	1.18	1.04	1.12	0.64	0.96	1.2	0.68

Figure 9.3 40 Interactions with theoretical course material's chapter PDFs by 2019_GE per student with time



	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
The Relational Model	0.02	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.04	0.10	0.12	0.08	0.08	0.13	0.17	0.02	0.01	0.03	0.01	0.03	0.02	0.07	0.06	0.02
Relational Algebra	0.02	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.04	0.10	0.12	0.08	0.08	0.13	0.17	0.02	0.01	0.03	0.01	0.03	0.02	0.07	0.06	0.02
Normalization	0.02	0.01	0.02	0.00	0.01	0.02	0.01	0.01	0.06	0.12	0.14	0.16	0.13	0.16	0.09	0.13	0.06	0.07	0.04	0.04	0.02	0.06	0.07	0.04
Logical Modelling II	0.02	0.01	0.00	0.02	0.01	0.00	0.00	0.02	0.04	0.14	0.16	0.20	0.19	0.25	0.23	0.16	0.10	0.10	0.09	0.05	0.07	0.05	0.02	0.05
Introduction to Database	0.02	0.01	0.01	0.01	0.00	0.01	0.01	0.02	0.03	0.14	0.20	0.17	0.21	0.22	0.17	0.12	0.09	0.10	0.05	0.10	0.05	0.05	0.07	0.05
ER Modelling Part	0.02	0.03	0.02	0.00	0.02	0.00	0.01	0.03	0.04	0.14	0.17	0.13	0.18	0.21	0.14	0.11	0.03	0.07	0.02	0.06	0.09	0.05	0.05	0.06
EER Modelling	0.02	0.01	0.02	0.00	0.01	0.00	0.01	0.03	0.03	0.09	0.11	0.14	0.12	0.14	0.13	0.05	0.05	0.08	0.02	0.03	0.06	0.07	0.05	0.03
Database Software Development Lifecycle	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.02	0.06	0.08	0.09	0.05	0.05	0.14	0.06	0.04	0.03	0.02	0.01	0.02	0.03	0.04	0.04	0.01
Database Environment	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.02	0.01	0.08	0.13	0.12	0.16	0.12	0.10	0.07	0.04	0.03	0.02	0.05	0.05	0.03	0.05	0.02
Database Architecture and Web	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.10	0.16	0.11	0.13	0.14	0.10	0.04	0.04	0.03	0.02	0.01	0.08	0.03	0.07	0.02
Conceptual DB Design	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.03	0.01	0.08	0.08	0.06	0.10	0.14	0.12	0.07	0.02	0.06	0.01	0.03	0.04	0.07	0.02	0.05
Case Study: University Accommodation Specification	0.02	0.02	0.01	0.00	0.00	0.01	0.04	0.01	0.03	0.11	0.13	0.12	0.10	0.13	0.21	0.08	0.09	0.02	0.05	0.02	0.06	0.05	0.03	0.05
Total number of interactions	0.22	0.09	0.10	0.06	0.06	0.05	0.08	0.23	0.41	1.27	1.61	1.42	1.53	1.94	1.69	0.92	0.58	0.64	0.37	0.48	0.60	0.64	0.58	0.43

Figure 9.3 41 Interactions with theoretical course material's chapter PDFs by 2019_U per student with time

Groups	Total Number of students	SQL Introduction	SQL P2: Aggregates	SQL P2: WHERE	SQL P3: ORDER BY and GROUP BY	SQL P4: Subqueries and Correlated	SQL P5: Sets	SQL P6: Multi-table Joins	SQL P7: Create and Alter Table	SQL P7: INSERT, UPDATE, DELETE	SQL P7: Views	SQL P8: Integrity Enhancement Features	SQL P8: Transactions and Access Control
2018_F2F	100	1.74	3.11	3.54	2.73	3.61	2.81	2.80	1.90	2.28	1.80	1.24	1.59
2018_DE	11	3.09	2.91	3.91	3.00	3.27	1.82	2.00	2.36	2.27	1.45	1.36	1.91
2019_DE	38	1.92	1.47	1.79	1.58	2.53	2.03	1.50	1.05	1.03	0.87	0.74	0.61
2019_GE	50	1.68	1.02	1.70	1.20	1.26	1.30	0.82	0.56	0.70	0.36	0.28	0.56
2019_U	173	1.39	1.47	1.81	1.20	1.79	1.64	1.21	1.05	1.26	0.76	0.73	0.73

Table 14 IPS with practical course material's chapter pdfs

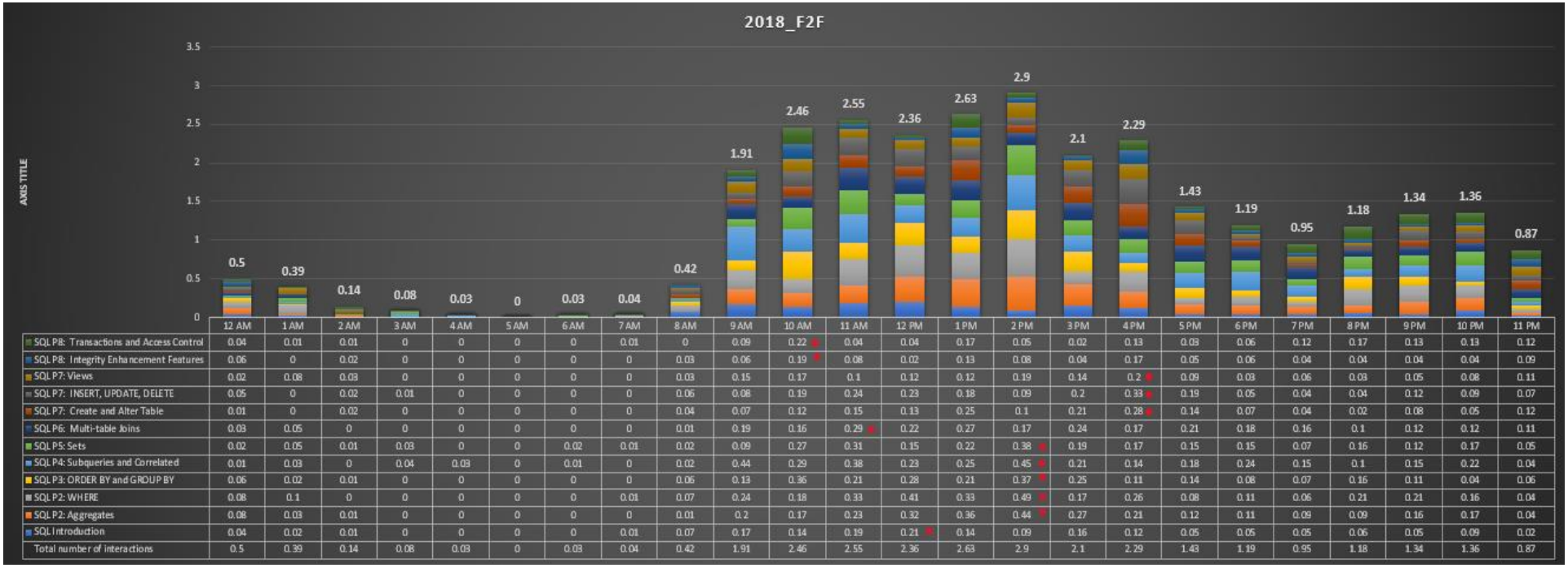
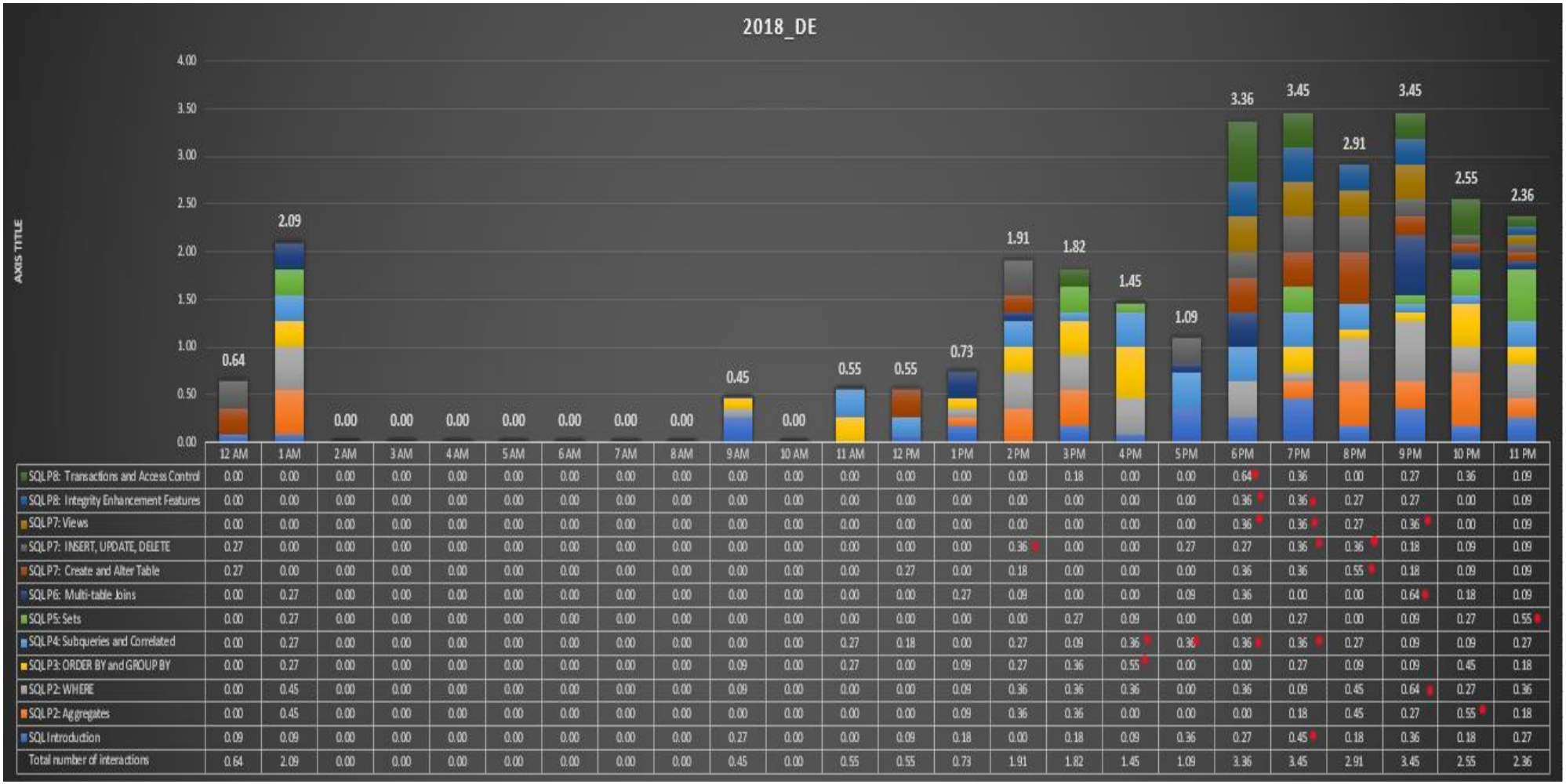
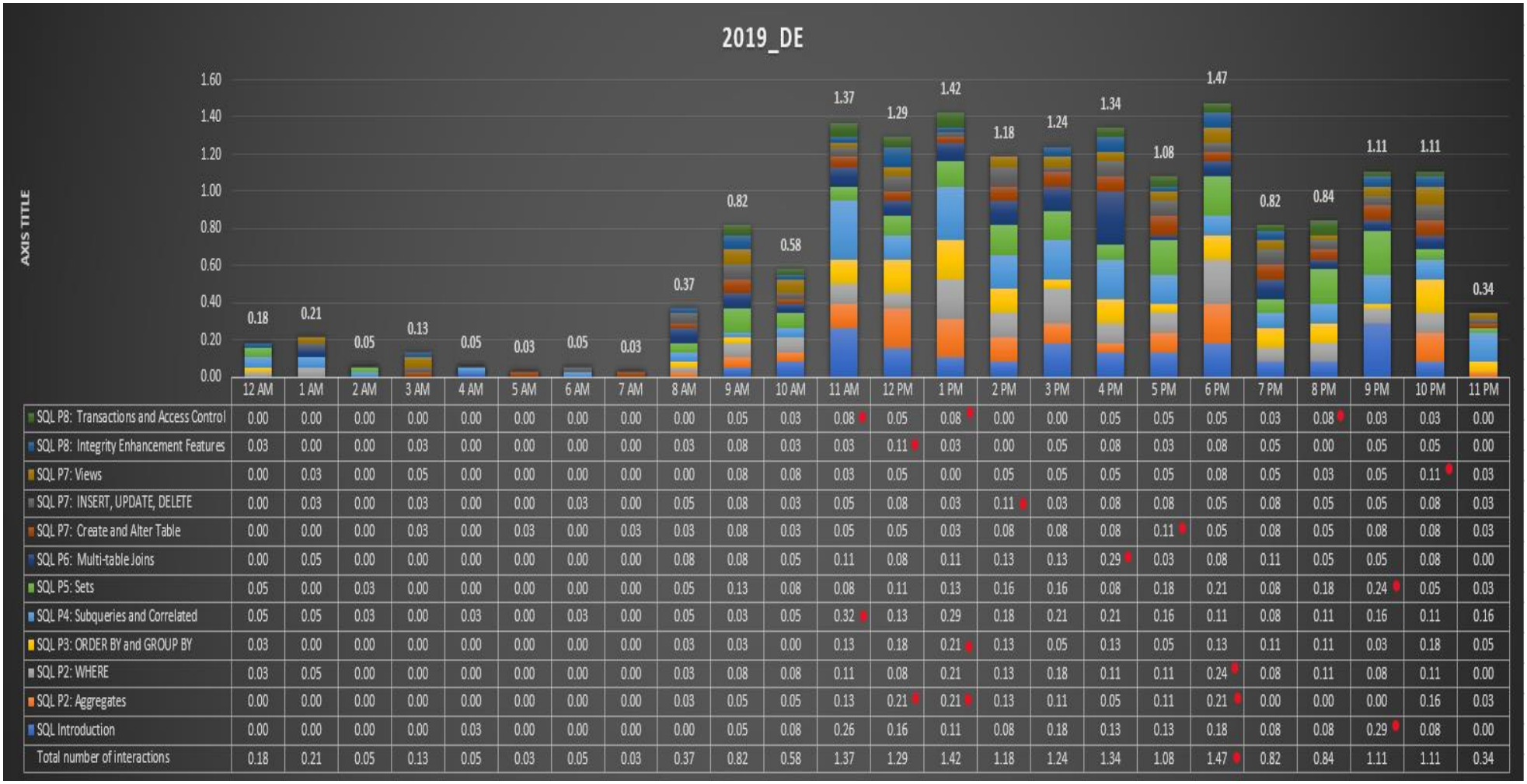


Figure 9.3 42 Interactions with practical course material's chapter PDFs by 2018_F2F per student with time



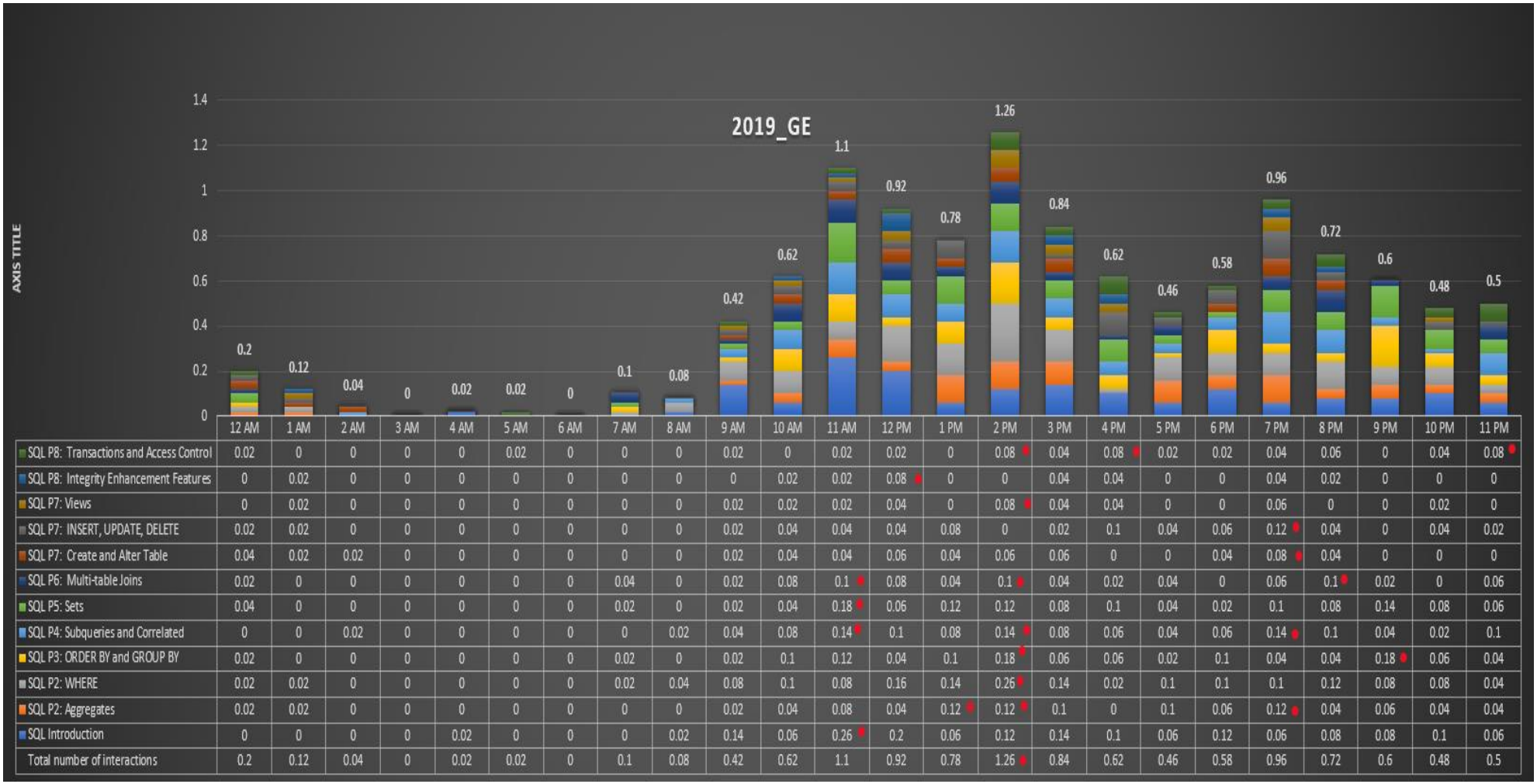
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
SQLP8: Transactions and Access Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.64	0.36	0.00	0.27	0.36	0.09
SQLP8: Integrity Enhancement Features	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.36	0.27	0.27	0.00	0.09
SQLP7: Views	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.36	0.27	0.36	0.00	0.09
SQLP7: INSERT, UPDATE, DELETE	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.00	0.27	0.27	0.36	0.36	0.18	0.09	0.09
SQLP7: Create and Alter Table	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.18	0.00	0.00	0.00	0.36	0.36	0.55	0.18	0.09	0.09
SQLP6: Multi-table Joins	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.09	0.00	0.00	0.09	0.36	0.00	0.00	0.64	0.18	0.09
SQLP5: Sets	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.09	0.00	0.00	0.27	0.00	0.09	0.27	0.55
SQLP4: Subqueries and Correlated	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.18	0.00	0.27	0.09	0.36	0.36	0.36	0.36	0.27	0.09	0.09	0.27
SQLP3: ORDER BY and GROUP BY	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.27	0.00	0.09	0.27	0.36	0.55	0.00	0.00	0.27	0.09	0.09	0.45	0.18
SQLP2: WHERE	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.09	0.36	0.36	0.36	0.00	0.36	0.09	0.45	0.64	0.27	0.36
SQLP2: Aggregates	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.36	0.36	0.00	0.00	0.00	0.18	0.45	0.27	0.55	0.18
SQLIntroduction	0.09	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.09	0.18	0.00	0.18	0.09	0.36	0.27	0.45	0.18	0.36	0.18	0.27
Total number of interactions	0.64	2.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.55	0.55	0.73	1.91	1.82	1.45	1.09	3.36	3.45	2.91	3.45	2.55	2.36

Figure 9.3 43 Interactions with practical course material's chapter PDFs by 2018_DE per student with time



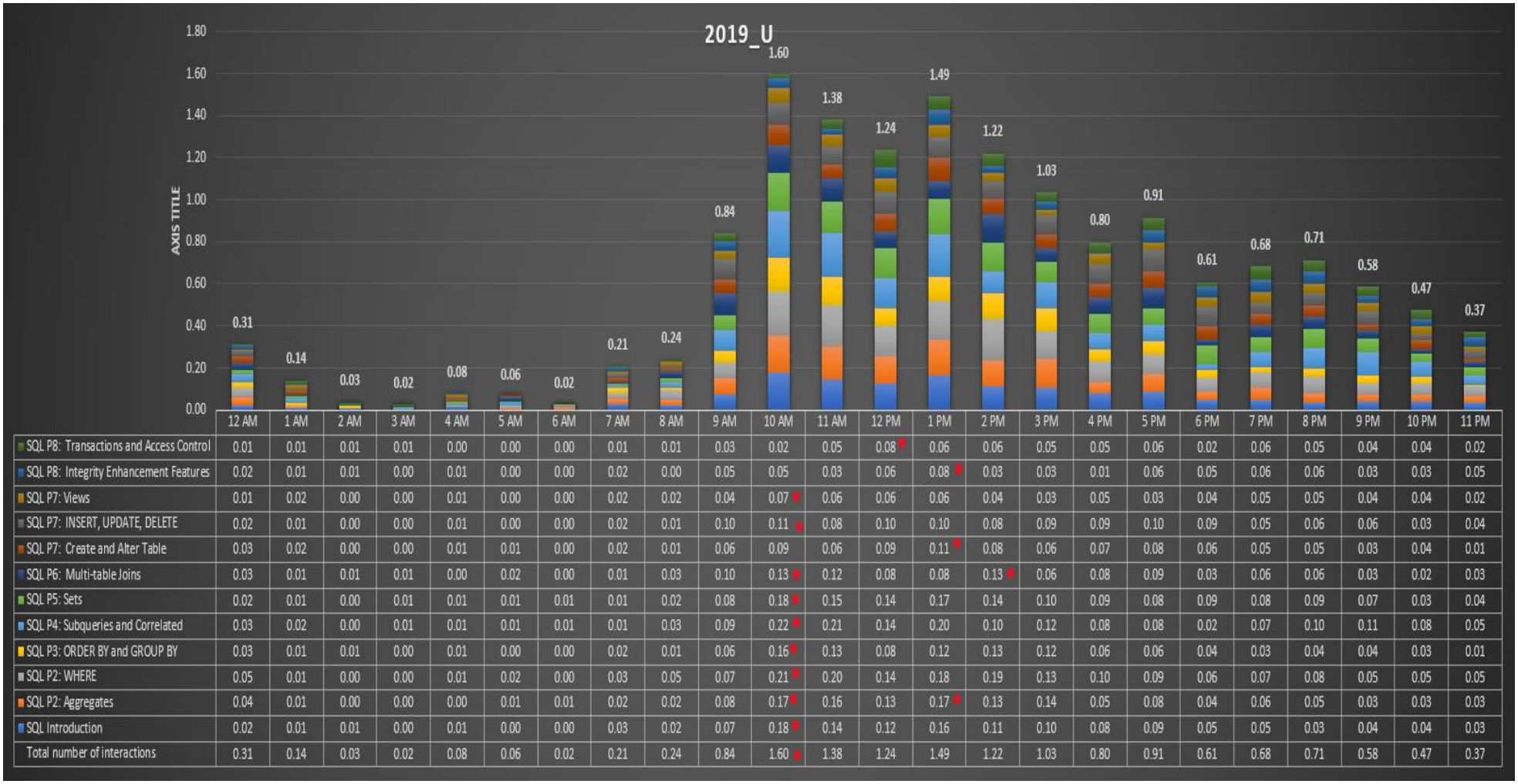
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
SQL P8: Transactions and Access Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.03	0.08	0.05	0.08	0.00	0.00	0.05	0.05	0.05	0.03	0.08	0.03	0.03	0.00
SQL P8: Integrity Enhancement Features	0.03	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.03	0.08	0.03	0.03	0.11	0.03	0.00	0.05	0.08	0.03	0.08	0.05	0.00	0.05	0.05	0.00
SQL P7: Views	0.00	0.03	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.03	0.05	0.00	0.05	0.05	0.05	0.05	0.08	0.05	0.03	0.05	0.11	0.03
SQL P7: INSERT, UPDATE, DELETE	0.00	0.03	0.00	0.03	0.00	0.00	0.03	0.00	0.05	0.08	0.03	0.05	0.08	0.03	0.11	0.03	0.08	0.08	0.05	0.08	0.05	0.05	0.08	0.03
SQL P7: Create and Alter Table	0.00	0.00	0.00	0.03	0.00	0.03	0.00	0.03	0.03	0.08	0.03	0.05	0.05	0.03	0.08	0.08	0.08	0.11	0.05	0.08	0.05	0.08	0.08	0.03
SQL P6: Multi-table Joins	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.05	0.11	0.08	0.11	0.13	0.13	0.29	0.03	0.08	0.11	0.05	0.05	0.08	0.00
SQL P5: Sets	0.05	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.05	0.13	0.08	0.08	0.11	0.13	0.16	0.16	0.08	0.18	0.21	0.08	0.18	0.24	0.05	0.03
SQL P4: Subqueries and Correlated	0.05	0.05	0.03	0.00	0.03	0.00	0.03	0.00	0.05	0.03	0.05	0.32	0.13	0.29	0.18	0.21	0.21	0.16	0.11	0.08	0.11	0.16	0.11	0.16
SQL P3: ORDER BY and GROUP BY	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.13	0.18	0.21	0.13	0.05	0.13	0.05	0.13	0.11	0.11	0.03	0.18	0.05
SQL P2: WHERE	0.03	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.08	0.08	0.11	0.08	0.21	0.13	0.18	0.11	0.11	0.24	0.08	0.11	0.08	0.11	0.00
SQL P2: Aggregates	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.05	0.13	0.21	0.21	0.13	0.11	0.05	0.11	0.21	0.00	0.00	0.00	0.16	0.03
SQL Introduction	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.05	0.08	0.26	0.16	0.11	0.08	0.18	0.13	0.13	0.18	0.08	0.08	0.29	0.08	0.00
Total number of interactions	0.18	0.21	0.05	0.13	0.05	0.03	0.05	0.03	0.37	0.82	0.58	1.37	1.29	1.42	1.18	1.24	1.34	1.08	1.47	0.82	0.84	1.11	1.11	0.34

Figure 9.3 44 Interactions with practical course material's chapter PDFs by 2019_DE per student with time



	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
SQL P8: Transactions and Access Control	0.02	0	0	0	0	0.02	0	0	0	0.02	0	0.02	0.02	0	0.08	0.04	0.08	0.02	0.02	0.04	0.06	0	0.04	0.08
SQL P8: Integrity Enhancement Features	0	0.02	0	0	0	0	0	0	0	0	0.02	0.02	0.08	0	0	0.04	0.04	0	0	0.04	0.02	0	0	0
SQL P7: Views	0	0.02	0	0	0	0	0	0	0	0.02	0.02	0.02	0.04	0	0.08	0.04	0.04	0	0	0.06	0	0	0.02	0
SQL P7: INSERT, UPDATE, DELETE	0.02	0.02	0	0	0	0	0	0	0	0.02	0.04	0.04	0.04	0.08	0	0.02	0.1	0.04	0.06	0.12	0.04	0	0.04	0.02
SQL P7: Create and Alter Table	0.04	0.02	0.02	0	0	0	0	0	0	0.02	0.04	0.04	0.06	0.04	0.06	0.06	0	0	0.04	0.08	0.04	0	0	0
SQL P6: Multi-table Joins	0.02	0	0	0	0	0	0	0.04	0	0.02	0.08	0.1	0.08	0.04	0.1	0.04	0.02	0.04	0	0.06	0.1	0.02	0	0.06
SQL P5: Sets	0.04	0	0	0	0	0	0	0.02	0	0.02	0.04	0.18	0.06	0.12	0.12	0.08	0.1	0.04	0.02	0.1	0.08	0.14	0.08	0.06
SQL P4: Subqueries and Correlated	0	0	0.02	0	0	0	0	0	0.02	0.04	0.08	0.14	0.1	0.08	0.14	0.08	0.06	0.04	0.06	0.14	0.1	0.04	0.02	0.1
SQL P3: ORDER BY and GROUP BY	0.02	0	0	0	0	0	0	0.02	0	0.02	0.1	0.12	0.04	0.1	0.18	0.06	0.06	0.02	0.1	0.04	0.04	0.18	0.06	0.04
SQL P2: WHERE	0.02	0.02	0	0	0	0	0	0.02	0.04	0.08	0.1	0.08	0.16	0.14	0.26	0.14	0.02	0.1	0.1	0.1	0.12	0.08	0.08	0.04
SQL P2: Aggregates	0.02	0.02	0	0	0	0	0	0	0	0.02	0.04	0.08	0.04	0.12	0.12	0.1	0	0.1	0.06	0.12	0.04	0.06	0.04	0.04
SQL Introduction	0	0	0	0	0.02	0	0	0	0.02	0.14	0.06	0.26	0.2	0.06	0.12	0.14	0.1	0.06	0.12	0.06	0.08	0.08	0.1	0.06
Total number of interactions	0.2	0.12	0.04	0	0.02	0.02	0	0.1	0.08	0.42	0.62	1.1	0.92	0.78	1.26	0.84	0.62	0.46	0.58	0.96	0.72	0.6	0.48	0.5

Figure 9.3 45 Interactions with practical course material's chapter PDFs by 2019_GE per student with time

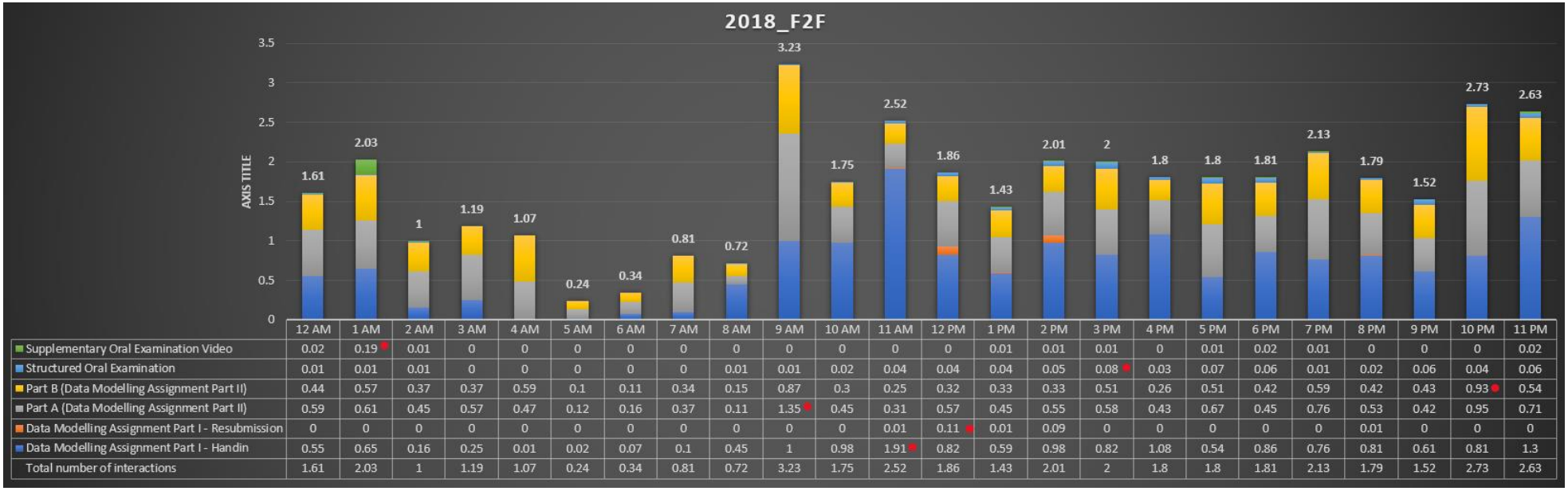


	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
SQL P8: Transactions and Access Control	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.03	0.02	0.05	0.08	0.06	0.06	0.05	0.05	0.06	0.02	0.06	0.05	0.04	0.04	0.02
SQL P8: Integrity Enhancement Features	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.02	0.00	0.05	0.05	0.03	0.06	0.08	0.03	0.03	0.01	0.06	0.05	0.06	0.06	0.03	0.03	0.05
SQL P7: Views	0.01	0.02	0.00	0.00	0.01	0.00	0.00	0.02	0.02	0.04	0.07	0.06	0.06	0.06	0.04	0.03	0.05	0.03	0.04	0.05	0.05	0.04	0.04	0.02
SQL P7: INSERT, UPDATE, DELETE	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.02	0.01	0.10	0.11	0.08	0.10	0.10	0.08	0.09	0.09	0.10	0.09	0.05	0.06	0.06	0.03	0.04
SQL P7: Create and Alter Table	0.03	0.02	0.00	0.00	0.01	0.01	0.00	0.02	0.01	0.06	0.09	0.06	0.09	0.11	0.08	0.06	0.07	0.08	0.06	0.05	0.05	0.03	0.04	0.01
SQL P6: Multi-table Joins	0.03	0.01	0.01	0.01	0.00	0.02	0.00	0.01	0.03	0.10	0.13	0.12	0.08	0.08	0.13	0.06	0.08	0.09	0.03	0.06	0.06	0.03	0.02	0.03
SQL P5: Sets	0.02	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.08	0.18	0.15	0.14	0.17	0.14	0.10	0.09	0.08	0.09	0.08	0.09	0.07	0.03	0.04
SQL P4: Subqueries and Correlated	0.03	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.09	0.22	0.21	0.14	0.20	0.10	0.12	0.08	0.08	0.02	0.07	0.10	0.11	0.08	0.05
SQL P3: ORDER BY and GROUP BY	0.03	0.01	0.01	0.00	0.01	0.00	0.00	0.02	0.01	0.06	0.16	0.13	0.08	0.12	0.13	0.12	0.06	0.06	0.04	0.03	0.04	0.04	0.03	0.01
SQL P2: WHERE	0.05	0.01	0.00	0.00	0.01	0.02	0.00	0.03	0.05	0.07	0.21	0.20	0.14	0.18	0.19	0.13	0.10	0.09	0.06	0.07	0.08	0.05	0.05	0.05
SQL P2: Aggregates	0.04	0.01	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.08	0.17	0.16	0.13	0.17	0.13	0.14	0.05	0.08	0.04	0.06	0.05	0.03	0.03	0.03
SQL Introduction	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.03	0.02	0.07	0.18	0.14	0.12	0.16	0.11	0.10	0.08	0.09	0.05	0.05	0.03	0.04	0.04	0.03
Total number of interactions	0.31	0.14	0.03	0.02	0.08	0.06	0.02	0.21	0.24	0.84	1.60	1.38	1.24	1.49	1.22	1.03	0.80	0.91	0.61	0.68	0.71	0.58	0.47	0.37

Figure 9.3 46 Interactions with practical course material's chapter PDFs by 2019_U per student with time

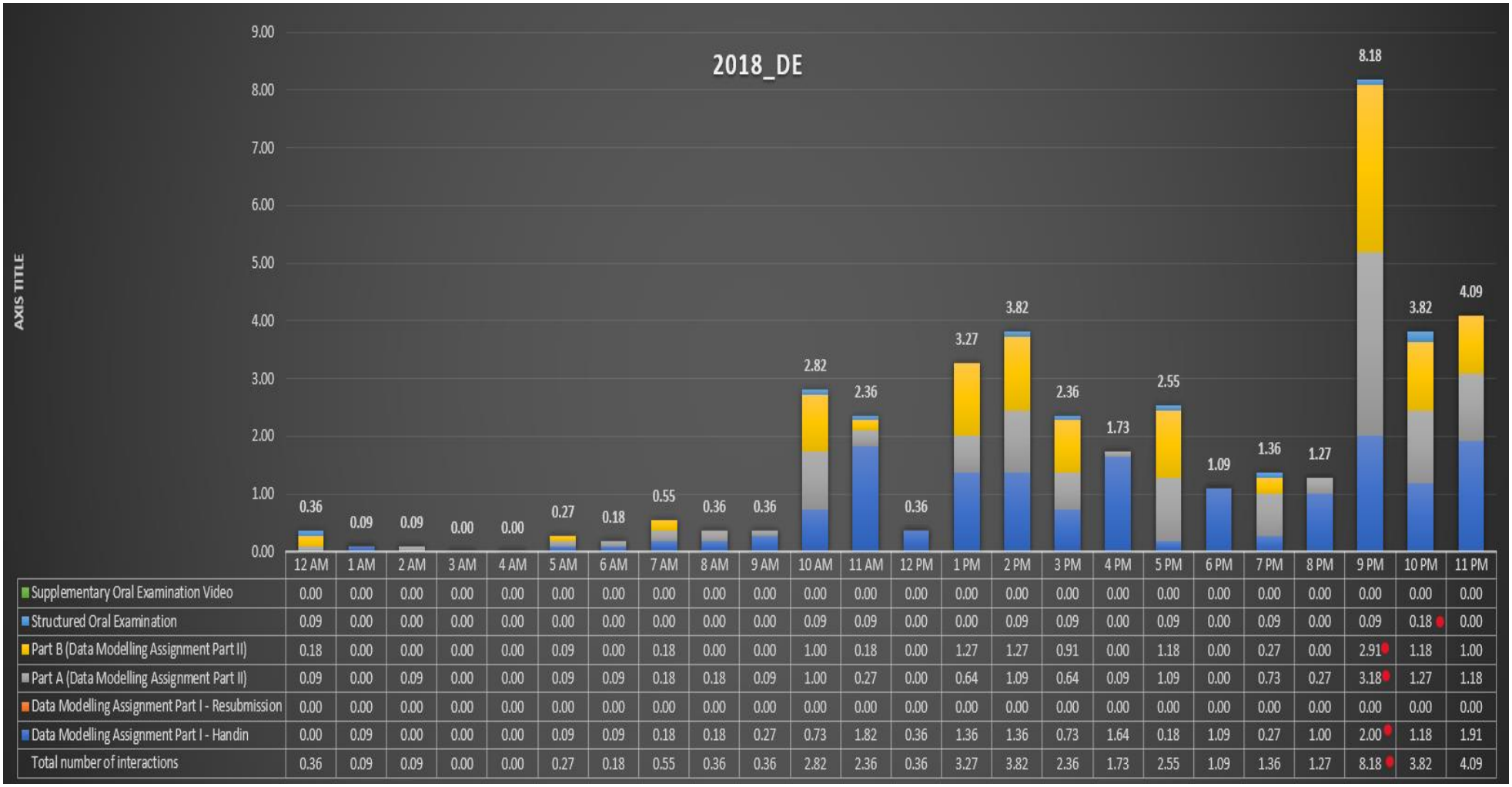
Groups	Total Number of students	Data Modelling Assignment Part I - Handin	Data Modelling Assignment Part I - Resubmission	Part A (Data Modelling Assignment Part II)	Part B (Data Modelling Assignment Part II)	Research Report (GE Only)	Structured Oral Examination	Supplementary Oral Examination Video
2018_F2F	100	16.13	0.23	12.63	10.05	0.00	0.67	0.31
2018_DE	11	16.55	0.00	12.27	11.64	0.00	0.91	0.00
2019_DE	38	5.66	0.00	2.68	2.61	0.00	0.00	0.00
2019_GE	50	4.20	0.18	2.70	3.10	3.18	0.00	0.18
2019_U	173	4.11	0.08	2.17	2.24	0.10	0.00	0.09

Table 15 IPS with assignment



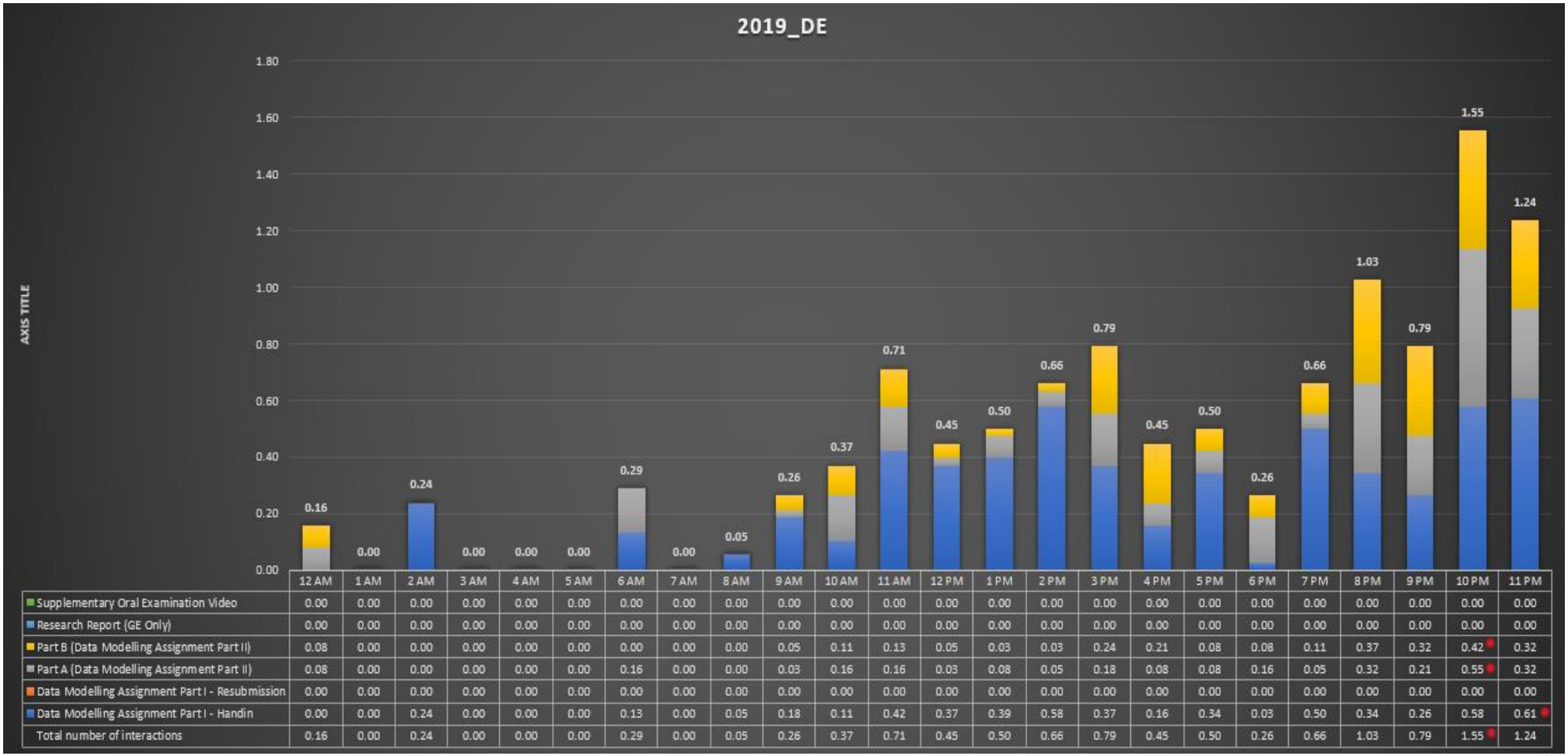
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Supplementary Oral Examination Video	0.02	0.19	0.01	0	0	0	0	0	0	0	0	0	0	0.01	0.01	0.01	0	0.01	0.02	0.01	0	0	0	0.02
Structured Oral Examination	0.01	0.01	0.01	0	0	0	0	0	0.01	0.01	0.02	0.04	0.04	0.04	0.05	0.08	0.03	0.07	0.06	0.01	0.02	0.06	0.04	0.06
Part B (Data Modelling Assignment Part II)	0.44	0.57	0.37	0.37	0.59	0.1	0.11	0.34	0.15	0.87	0.3	0.25	0.32	0.33	0.33	0.51	0.26	0.51	0.42	0.59	0.42	0.43	0.93	0.54
Part A (Data Modelling Assignment Part II)	0.59	0.61	0.45	0.57	0.47	0.12	0.16	0.37	0.11	1.35	0.45	0.31	0.57	0.45	0.55	0.58	0.43	0.67	0.45	0.76	0.53	0.42	0.95	0.71
Data Modelling Assignment Part I - Resubmission	0	0	0	0	0	0	0	0	0	0	0	0.01	0.11	0.01	0.09	0	0	0	0	0	0.01	0	0	0
Data Modelling Assignment Part I - Handin	0.55	0.65	0.16	0.25	0.01	0.02	0.07	0.1	0.45	1	0.98	1.91	0.82	0.59	0.98	0.82	1.08	0.54	0.86	0.76	0.81	0.61	0.81	1.3
Total number of interactions	1.61	2.03	1	1.19	1.07	0.24	0.34	0.81	0.72	3.23	1.75	2.52	1.86	1.43	2.01	2	1.8	1.8	1.81	2.13	1.79	1.52	2.73	2.63

Figure 9.3 47 IPS with assignments by 2018_F2F with time



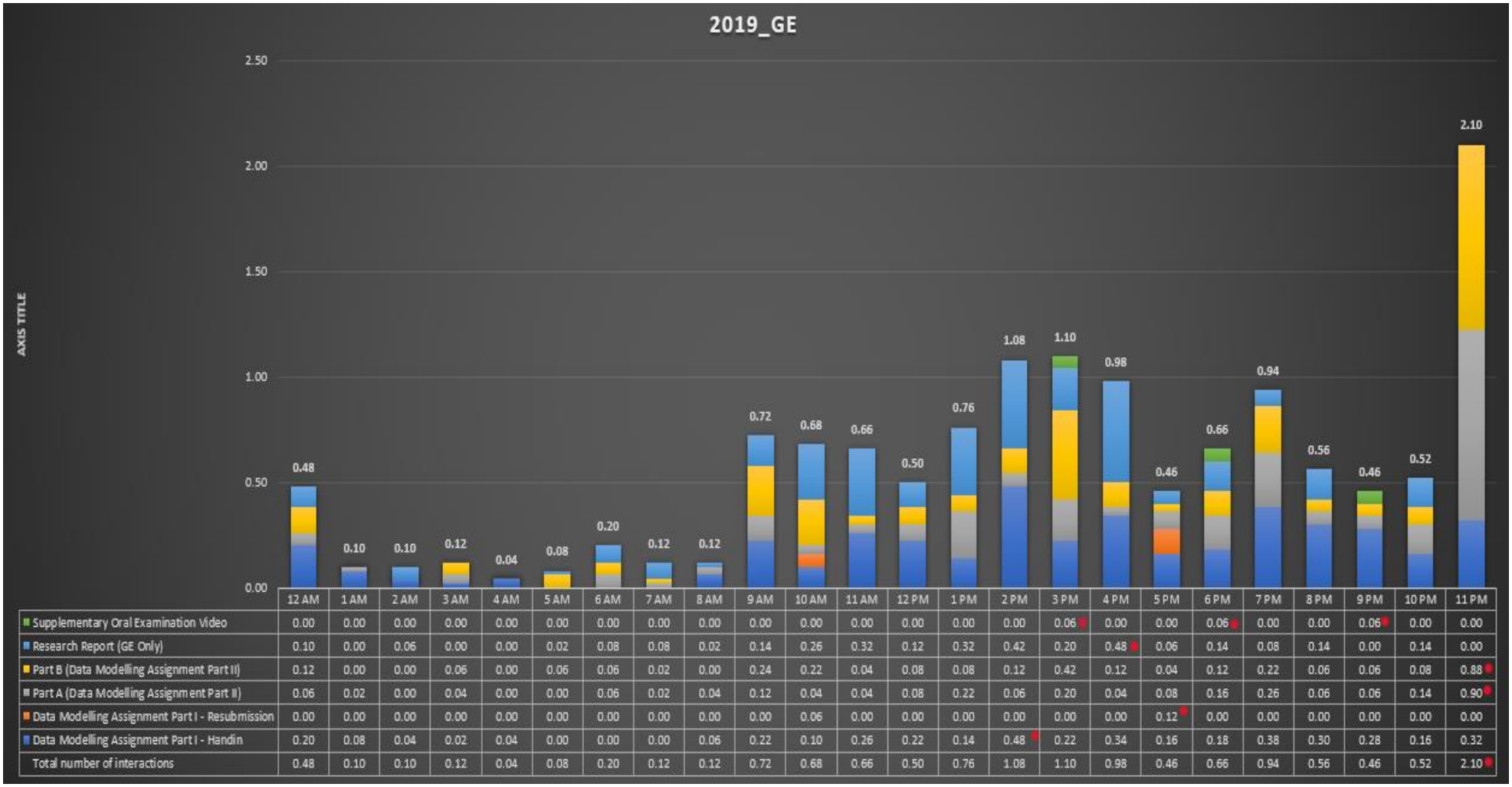
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Supplementary Oral Examination Video	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Structured Oral Examination	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.00	0.00	0.09	0.09	0.00	0.09	0.00	0.09	0.00	0.09	0.18	0.00
Part B (Data Modelling Assignment Part II)	0.18	0.00	0.00	0.00	0.00	0.09	0.00	0.18	0.00	0.00	1.00	0.18	0.00	1.27	1.27	0.91	0.00	1.18	0.00	0.27	0.00	2.91	1.18	1.00
Part A (Data Modelling Assignment Part II)	0.09	0.00	0.09	0.00	0.00	0.09	0.09	0.18	0.18	0.09	1.00	0.27	0.00	0.64	1.09	0.64	0.09	1.09	0.00	0.73	0.27	3.18	1.27	1.18
Data Modelling Assignment Part I - Resubmission	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Data Modelling Assignment Part I - Handin	0.00	0.09	0.00	0.00	0.00	0.09	0.09	0.18	0.18	0.27	0.73	1.82	0.36	1.36	1.36	0.73	1.64	0.18	1.09	0.27	1.00	2.00	1.18	1.91
Total number of interactions	0.36	0.09	0.09	0.00	0.00	0.27	0.18	0.55	0.36	0.36	2.82	2.36	0.36	3.27	3.82	2.36	1.73	2.55	1.09	1.36	1.27	8.18	3.82	4.09

Figure 9.3 48 IPS with assignments by 2018_DE with time



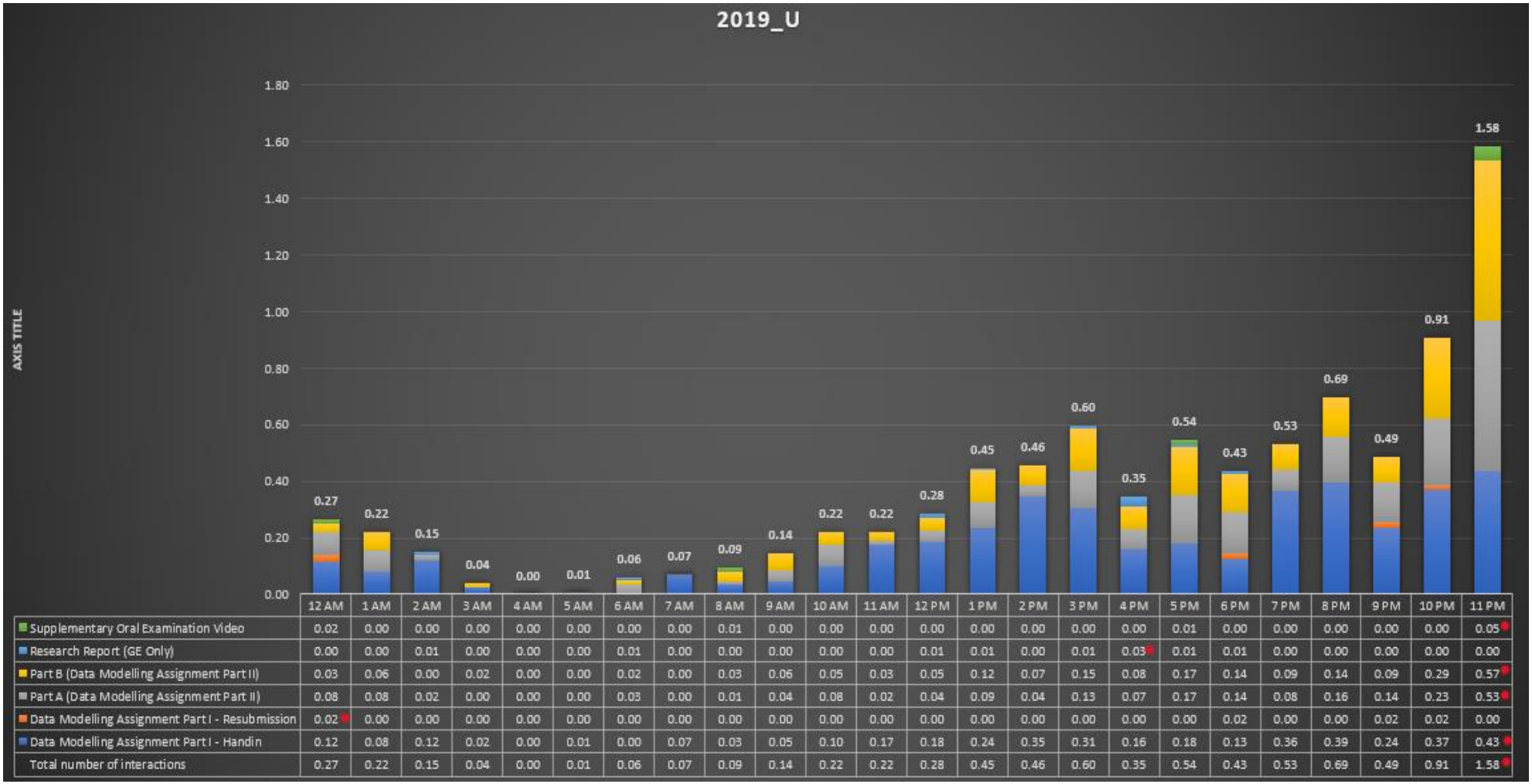
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Supplementary Oral Examination Video	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Research Report (GE Only)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Part B (Data Modelling Assignment Part II)	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.11	0.13	0.05	0.03	0.03	0.24	0.21	0.08	0.08	0.11	0.37	0.32	0.42	0.32
Part A (Data Modelling Assignment Part II)	0.08	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.00	0.03	0.16	0.16	0.03	0.08	0.05	0.18	0.08	0.08	0.16	0.05	0.32	0.21	0.55	0.32
Data Modelling Assignment Part I - Resubmission	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Data Modelling Assignment Part I - Handin	0.00	0.00	0.24	0.00	0.00	0.00	0.13	0.00	0.05	0.18	0.11	0.42	0.37	0.39	0.58	0.37	0.16	0.34	0.03	0.50	0.34	0.26	0.58	0.61
Total number of interactions	0.16	0.00	0.24	0.00	0.00	0.00	0.29	0.00	0.05	0.26	0.37	0.71	0.45	0.50	0.66	0.79	0.45	0.50	0.26	0.66	1.03	0.79	1.55	1.24

Figure 9.3 49 IPS with assignments by 2019_DE with time



	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Supplementary Oral Examination Video	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.06	0.00	0.00	0.06	0.00	0.00
Research Report (GE Only)	0.10	0.00	0.06	0.00	0.00	0.02	0.08	0.08	0.02	0.14	0.26	0.32	0.12	0.32	0.42	0.20	0.48	0.06	0.14	0.08	0.14	0.00	0.14	0.00
Part B (Data Modelling Assignment Part II)	0.12	0.00	0.00	0.06	0.00	0.06	0.06	0.02	0.00	0.24	0.22	0.04	0.08	0.08	0.12	0.42	0.12	0.04	0.12	0.22	0.06	0.06	0.08	0.88
Part A (Data Modelling Assignment Part II)	0.06	0.02	0.00	0.04	0.00	0.00	0.06	0.02	0.04	0.12	0.04	0.04	0.08	0.22	0.06	0.20	0.04	0.08	0.16	0.26	0.06	0.06	0.14	0.90
Data Modelling Assignment Part I - Resubmission	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00
Data Modelling Assignment Part I - Handin	0.20	0.08	0.04	0.02	0.04	0.00	0.00	0.00	0.06	0.22	0.10	0.26	0.22	0.14	0.48	0.22	0.34	0.16	0.18	0.38	0.30	0.28	0.16	0.32
Total number of interactions	0.48	0.10	0.10	0.12	0.04	0.08	0.20	0.12	0.12	0.72	0.68	0.66	0.50	0.76	1.08	1.10	0.98	0.46	0.66	0.94	0.56	0.46	0.52	2.10

Figure 9.3 50 IPS with assignments by 2019_GE with time

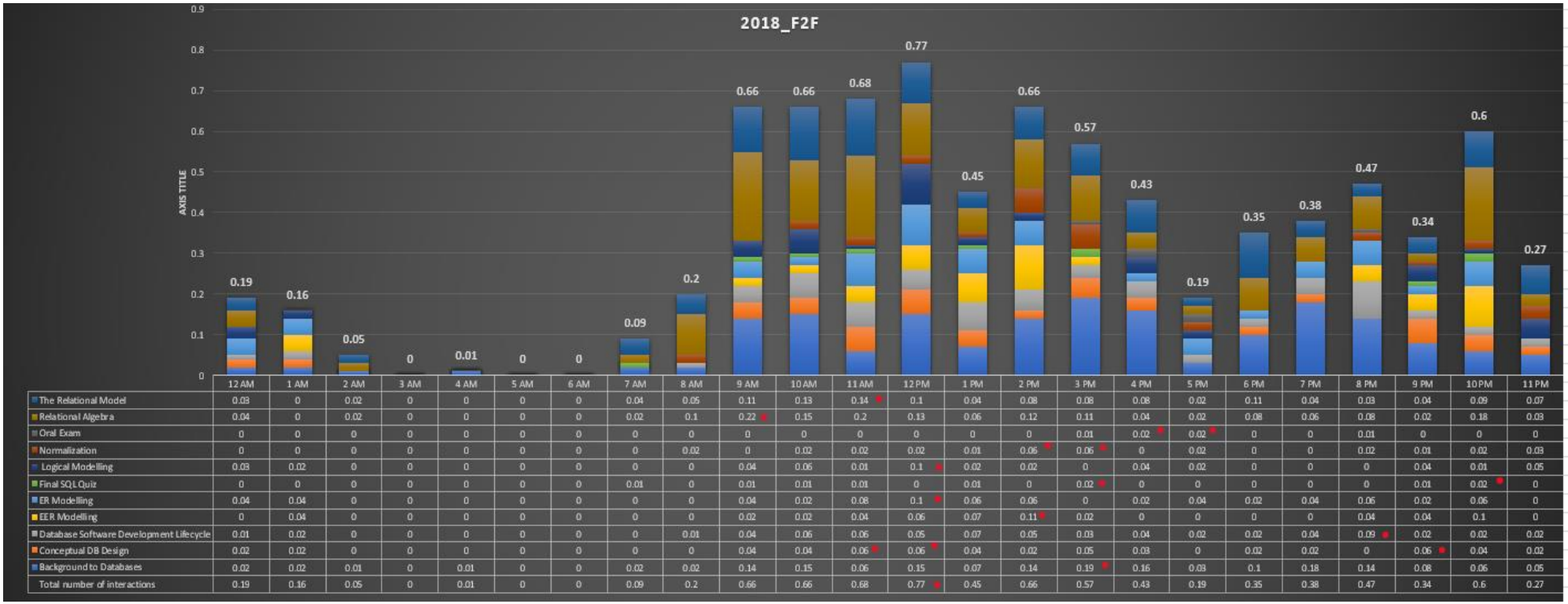


	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
Supplementary Oral Examination Video	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.05
Research Report (GE Only)	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Part B (Data Modelling Assignment Part II)	0.03	0.06	0.00	0.02	0.00	0.00	0.02	0.00	0.03	0.06	0.05	0.03	0.05	0.12	0.07	0.15	0.08	0.17	0.14	0.09	0.14	0.09	0.29	0.57
Part A (Data Modelling Assignment Part II)	0.08	0.08	0.02	0.00	0.00	0.00	0.03	0.00	0.01	0.04	0.08	0.02	0.04	0.09	0.04	0.13	0.07	0.17	0.14	0.08	0.16	0.14	0.23	0.53
Data Modelling Assignment Part I - Resubmission	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02	0.02	0.00
Data Modelling Assignment Part I - Handin	0.12	0.08	0.12	0.02	0.00	0.01	0.00	0.07	0.03	0.05	0.10	0.17	0.18	0.24	0.35	0.31	0.16	0.18	0.13	0.36	0.39	0.24	0.37	0.43
Total number of interactions	0.27	0.22	0.15	0.04	0.00	0.01	0.06	0.07	0.09	0.14	0.22	0.22	0.28	0.45	0.46	0.60	0.35	0.54	0.43	0.53	0.69	0.49	0.91	1.58

Figure 9.3 51 IPS with assignments by 2019_U with time

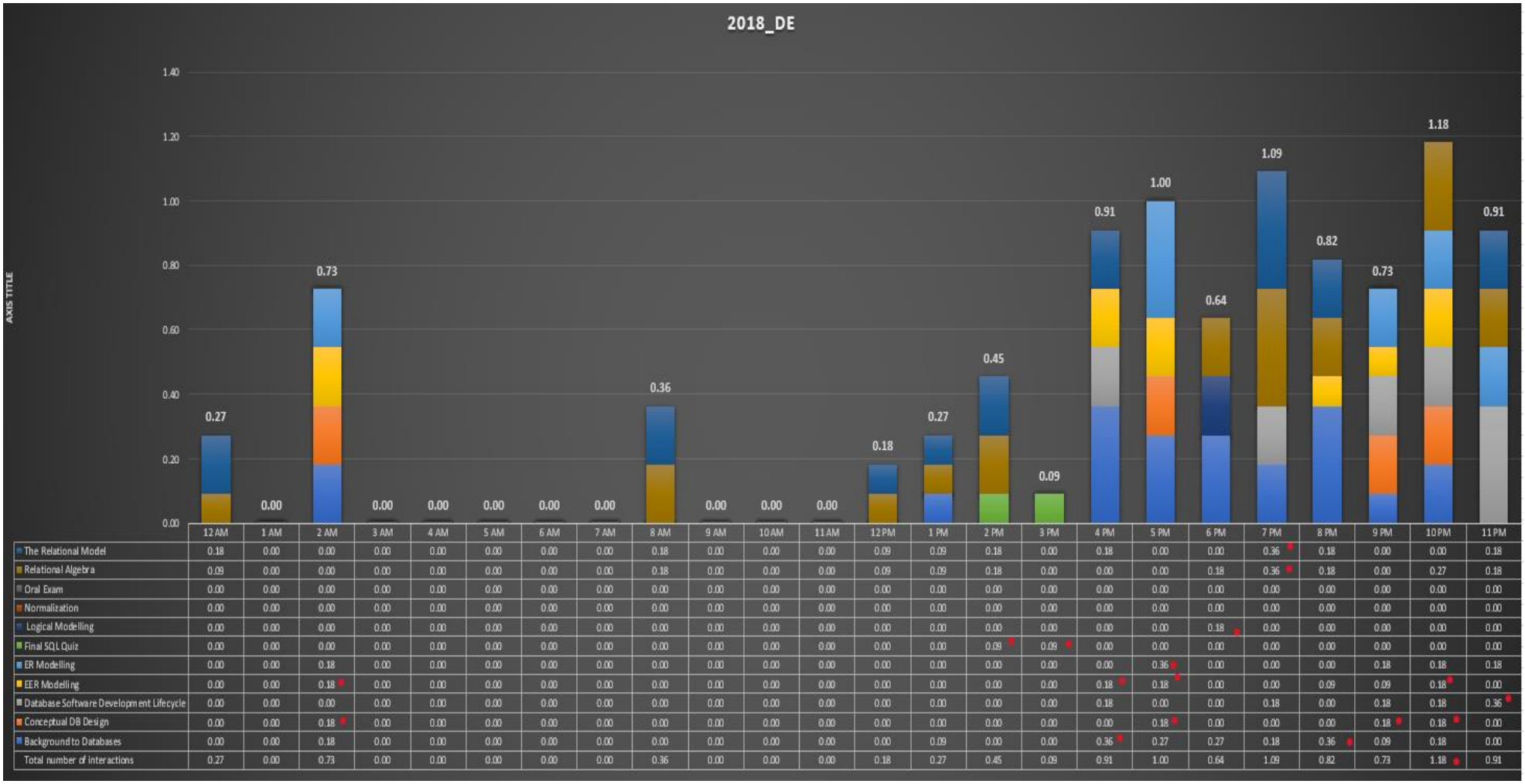
Groups	Total Number of students	Background to Databases	Conceptual DB Design	Database Software Development Lifecycle	EER Modelling	ER Modelling	Final SQL Quiz	Logical Modelling	Normalization	Oral Exam	Relational Algebra	The Relational Model
2018_F2F	100	1.80	0.54	0.67	0.56	0.70	0.10	0.46	0.31	0.06	1.68	1.30
2018_DE	11	2.00	0.73	1.09	0.91	1.09	0.18	0.18	0.00	0.00	1.82	1.64

Table 16 IPS with muddiest point for theoretical material



	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
The Relational Model	0.03	0	0.02	0	0	0	0	0.04	0.05	0.11	0.13	0.14	0.1	0.04	0.08	0.08	0.08	0.02	0.11	0.04	0.03	0.04	0.09	0.07
Relational Algebra	0.04	0	0.02	0	0	0	0	0.02	0.1	0.22	0.15	0.2	0.13	0.06	0.12	0.11	0.04	0.02	0.08	0.06	0.08	0.02	0.18	0.03
Oral Exam	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.02	0.02	0	0	0.01	0	0	0
Normalization	0	0	0	0	0	0	0	0	0.02	0	0.02	0.02	0.02	0.01	0.06	0.06	0	0.02	0	0	0.02	0.01	0.02	0.03
Logical Modelling	0.03	0.02	0	0	0	0	0	0	0	0.04	0.06	0.01	0.1	0.02	0.02	0	0.04	0.02	0	0	0	0.04	0.01	0.05
Final SQL Quiz	0	0	0	0	0	0	0	0.01	0	0.01	0.01	0.01	0	0.01	0	0.02	0	0	0	0	0	0.01	0.02	0
ER Modelling	0.04	0.04	0	0	0	0	0	0	0	0.04	0.02	0.08	0.1	0.06	0.06	0	0.02	0.04	0.02	0.04	0.06	0.02	0.06	0
EER Modelling	0	0.04	0	0	0	0	0	0	0	0.02	0.02	0.04	0.06	0.07	0.11	0.02	0	0	0	0	0.04	0.04	0.1	0
Database Software Development Lifecycle	0.01	0.02	0	0	0	0	0	0	0.01	0.04	0.06	0.06	0.05	0.07	0.05	0.03	0.04	0.02	0.02	0.04	0.09	0.02	0.02	0.02
Conceptual DB Design	0.02	0.02	0	0	0	0	0	0	0	0.04	0.04	0.06	0.06	0.04	0.02	0.05	0.03	0	0.02	0.02	0	0.06	0.04	0.02
Background to Databases	0.02	0.02	0.01	0	0.01	0	0	0.02	0.02	0.14	0.15	0.06	0.15	0.07	0.14	0.19	0.16	0.03	0.1	0.18	0.14	0.08	0.06	0.05
Total number of interactions	0.19	0.16	0.05	0	0.01	0	0	0.09	0.2	0.66	0.66	0.68	0.77	0.45	0.66	0.57	0.43	0.19	0.35	0.38	0.47	0.34	0.6	0.27

Figure 9.3 52 IPS with muddiest point of theoretical material by 2018_F2F with time

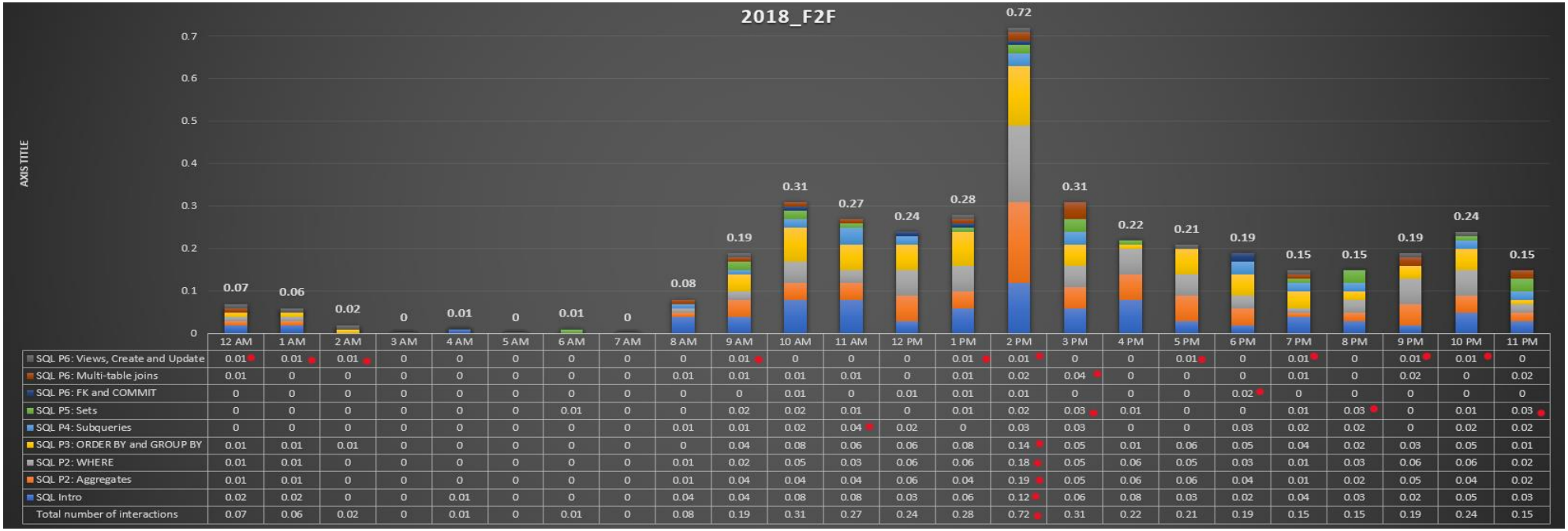


	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
The Relational Model	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.09	0.09	0.18	0.00	0.18	0.00	0.00	0.36	0.18	0.00	0.00	0.18
Relational Algebra	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.09	0.09	0.18	0.00	0.00	0.00	0.18	0.36	0.18	0.00	0.27	0.18
Oral Exam	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Normalization	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Logical Modelling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00
Final SQL Quiz	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ER Modelling	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.00	0.00	0.18	0.18	0.18
EER Modelling	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.18	0.00	0.00	0.09	0.09	0.18	0.00
Database Software Development Lifecycle	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.18	0.00	0.18	0.18	0.36
Conceptual DB Design	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.18	0.18	0.00
Background to Databases	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.36	0.27	0.27	0.18	0.36	0.09	0.18	0.00
Total number of interactions	0.27	0.00	0.73	0.00	0.00	0.00	0.00	0.00	0.36	0.00	0.00	0.00	0.18	0.27	0.45	0.09	0.91	1.00	0.64	1.09	0.82	0.73	1.18	0.91

Figure 9.3 53 IPS with muddiest point of theoretical material by 2018_DE with time

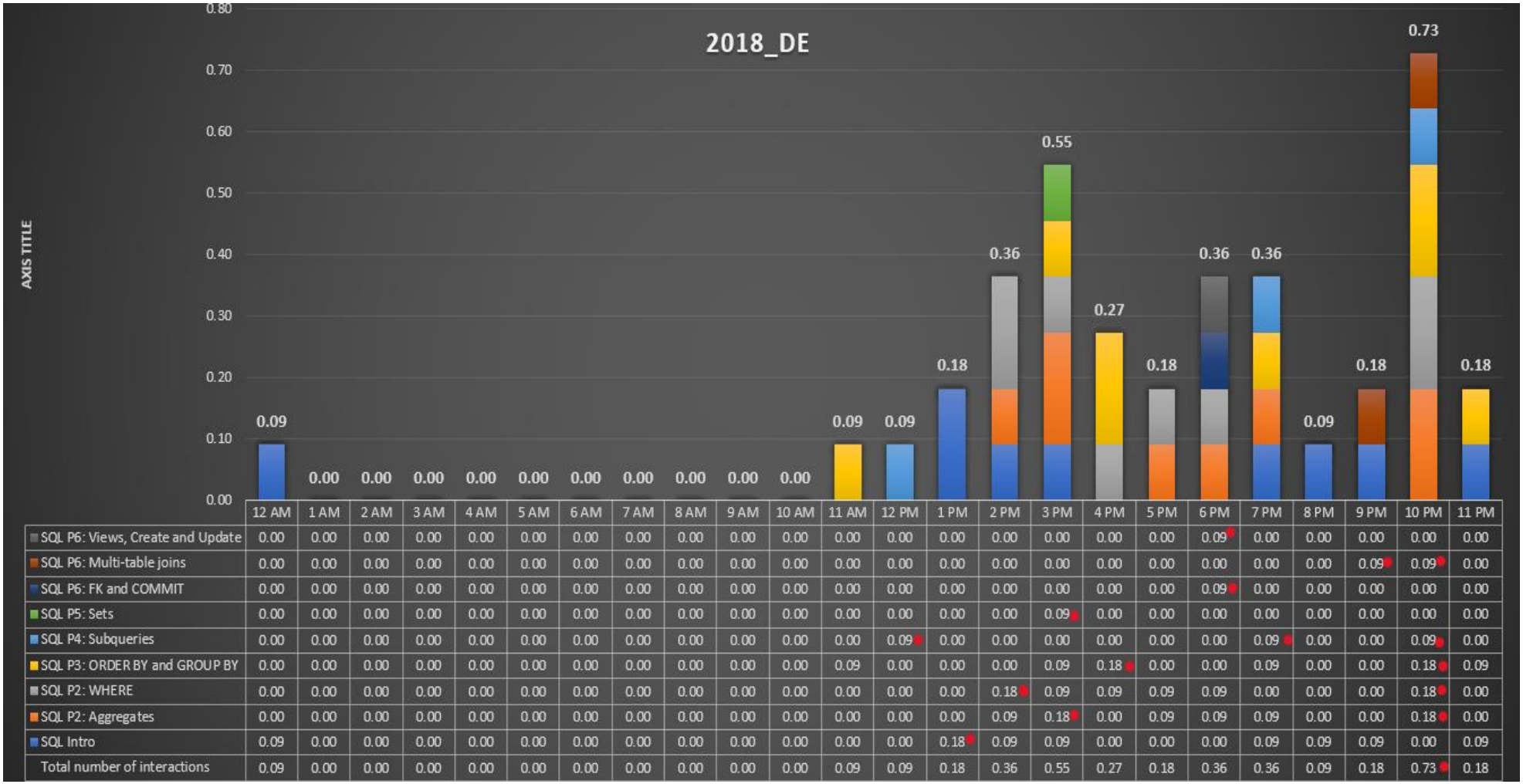
Groups	Total Number of students	SQL Intro	SQL P2: Aggregates	SQL P2: WHERE	SQL P3: ORDER BY and GROUP BY	SQL P4: Subqueries	SQL P5: Sets	SQL P6: FK and COMMIT	SQL P6: Multi-table joins	SQL P6: Views, Create and Update
2018_F2F	100	0.86	0.79	0.80	0.81	0.27	0.21	0.06	0.17	0.10
2018_DE	11	0.82	0.73	0.73	0.73	0.27	0.09	0.09	0.18	0.09

Table 17 IPS with muddiest point for practical material



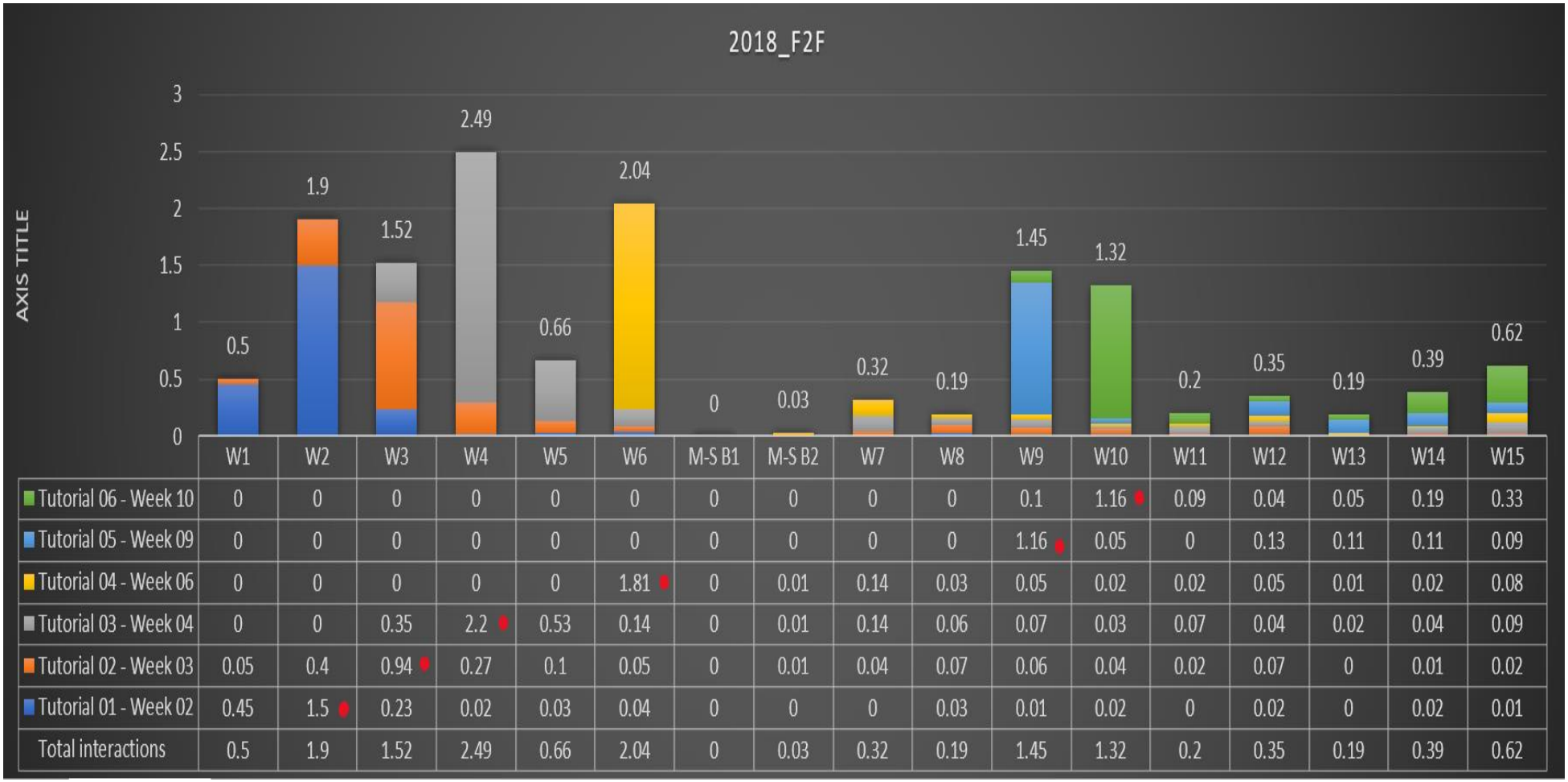
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
SQL P6: Views, Create and Update	0.01	0.01	0.01	0	0	0	0	0	0	0.01	0	0	0	0.01	0.01	0	0	0.01	0	0.01	0	0.01	0.01	0
SQL P6: Multi-table joins	0.01	0	0	0	0	0	0	0	0.01	0.01	0.01	0.01	0	0.01	0.02	0.04	0	0	0	0.01	0	0.02	0	0.02
SQL P6: FK and COMMIT	0	0	0	0	0	0	0	0	0	0	0.01	0	0.01	0.01	0.01	0	0	0	0.02	0	0	0	0	0
SQL P5: Sets	0	0	0	0	0	0	0.01	0	0	0.02	0.02	0.01	0	0.01	0.02	0.03	0.01	0	0	0.01	0.03	0	0.01	0.03
SQL P4: Subqueries	0	0	0	0	0	0	0	0	0.01	0.01	0.02	0.04	0.02	0	0.03	0.03	0	0	0.03	0.02	0.02	0	0.02	0.02
SQL P3: ORDER BY and GROUP BY	0.01	0.01	0.01	0	0	0	0	0	0	0.04	0.08	0.06	0.06	0.08	0.14	0.05	0.01	0.06	0.05	0.04	0.02	0.03	0.05	0.01
SQL P2: WHERE	0.01	0.01	0	0	0	0	0	0	0.01	0.02	0.05	0.03	0.06	0.06	0.18	0.05	0.06	0.05	0.03	0.01	0.03	0.06	0.06	0.02
SQL P2: Aggregates	0.01	0.01	0	0	0	0	0	0	0.01	0.04	0.04	0.04	0.06	0.04	0.19	0.05	0.06	0.06	0.04	0.01	0.02	0.05	0.04	0.02
SQL Intro	0.02	0.02	0	0	0.01	0	0	0	0.04	0.04	0.08	0.08	0.03	0.06	0.12	0.06	0.08	0.03	0.02	0.04	0.03	0.02	0.05	0.03
Total number of interactions	0.07	0.06	0.02	0	0.01	0	0.01	0	0.08	0.19	0.31	0.27	0.24	0.28	0.72	0.31	0.22	0.21	0.19	0.15	0.15	0.19	0.24	0.15

Figure 9.3 54 IPS with muddiest point of practical material by 2018_F2F with time



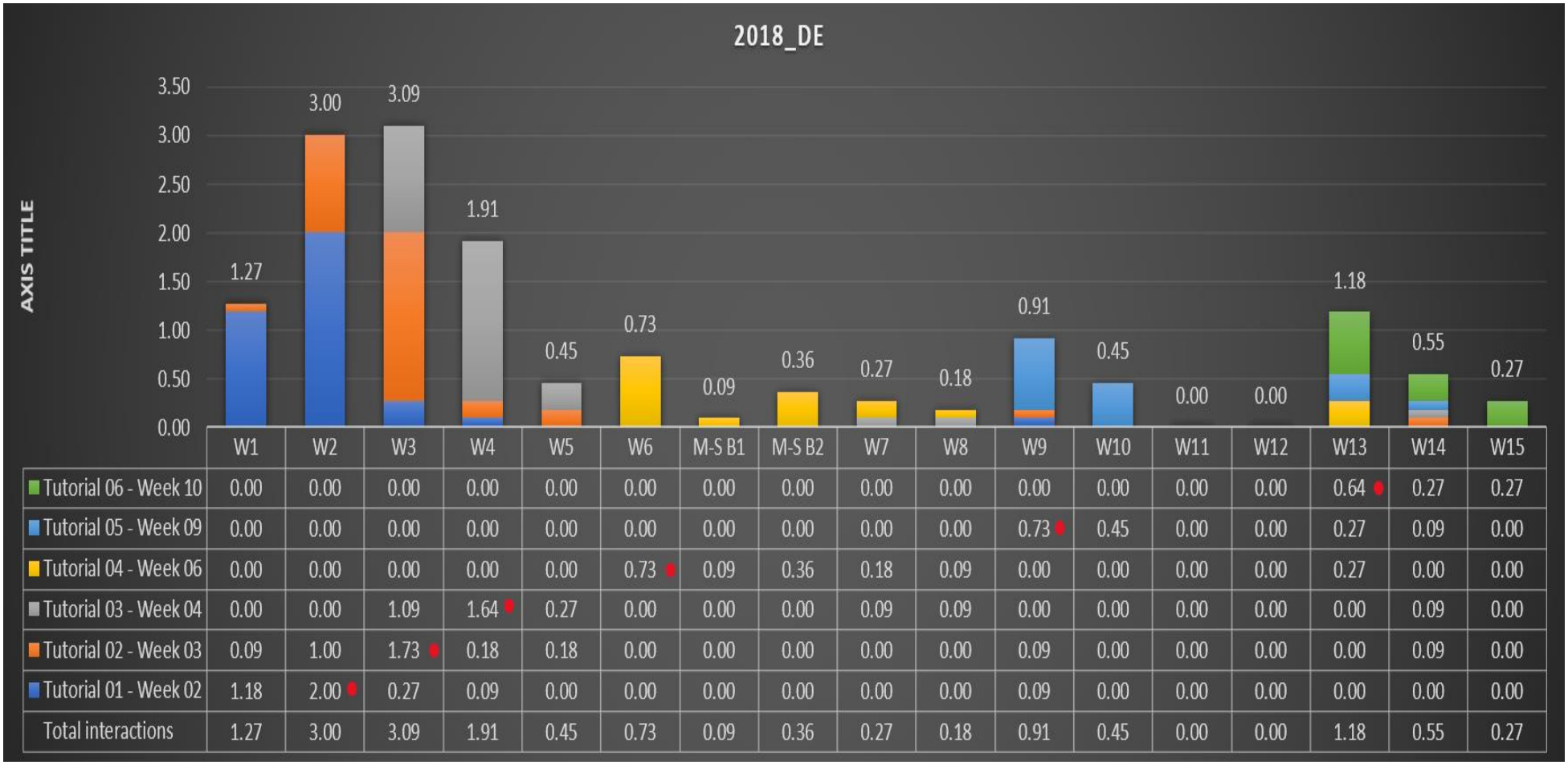
	12 AM	1 AM	2 AM	3 AM	4 AM	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM	9 PM	10 PM	11 PM
SQL P6: Views, Create and Update	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00
SQL P6: Multi-table joins	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.00
SQL P6: FK and COMMIT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00
SQL P5: Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SQL P4: Subqueries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.09	0.00
SQL P3: ORDER BY and GROUP BY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.09	0.18	0.00	0.00	0.09	0.00	0.00	0.18	0.09
SQL P2: WHERE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.09	0.09	0.09	0.09	0.00	0.00	0.00	0.18	0.00
SQL P2: Aggregates	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.18	0.00	0.09	0.09	0.09	0.00	0.00	0.18	0.00
SQL Intro	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.09	0.09	0.00	0.00	0.00	0.09	0.09	0.09	0.00	0.09
Total number of interactions	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.18	0.36	0.55	0.27	0.18	0.36	0.36	0.09	0.18	0.73	0.18

Figure 9.3 55 IPS with muddiest point of practical material by 2018_DE with time



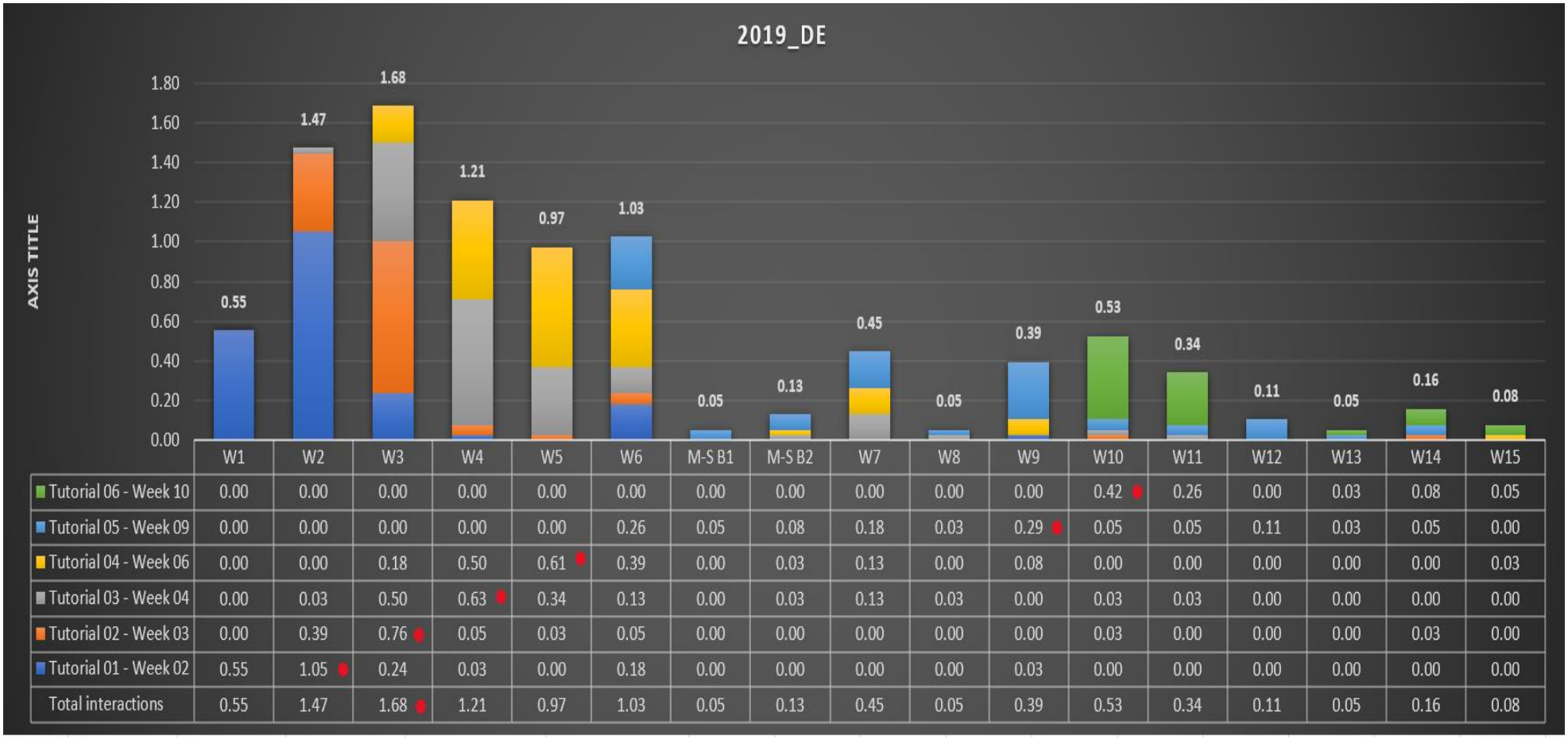
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Tutorial 06 - Week 10	0	0	0	0	0	0	0	0	0	0	0.1	1.16	0.09	0.04	0.05	0.19	0.33
Tutorial 05 - Week 09	0	0	0	0	0	0	0	0	0	0	1.16	0.05	0	0.13	0.11	0.11	0.09
Tutorial 04 - Week 06	0	0	0	0	0	1.81	0	0.01	0.14	0.03	0.05	0.02	0.02	0.05	0.01	0.02	0.08
Tutorial 03 - Week 04	0	0	0.35	2.2	0.53	0.14	0	0.01	0.14	0.06	0.07	0.03	0.07	0.04	0.02	0.04	0.09
Tutorial 02 - Week 03	0.05	0.4	0.94	0.27	0.1	0.05	0	0.01	0.04	0.07	0.06	0.04	0.02	0.07	0	0.01	0.02
Tutorial 01 - Week 02	0.45	1.5	0.23	0.02	0.03	0.04	0	0	0	0.03	0.01	0.02	0	0.02	0	0.02	0.01
Total interactions	0.5	1.9	1.52	2.49	0.66	2.04	0	0.03	0.32	0.19	1.45	1.32	0.2	0.35	0.19	0.39	0.62

Figure 9.4. 2 Weekly IPS with tutorial files by 2018_F2F



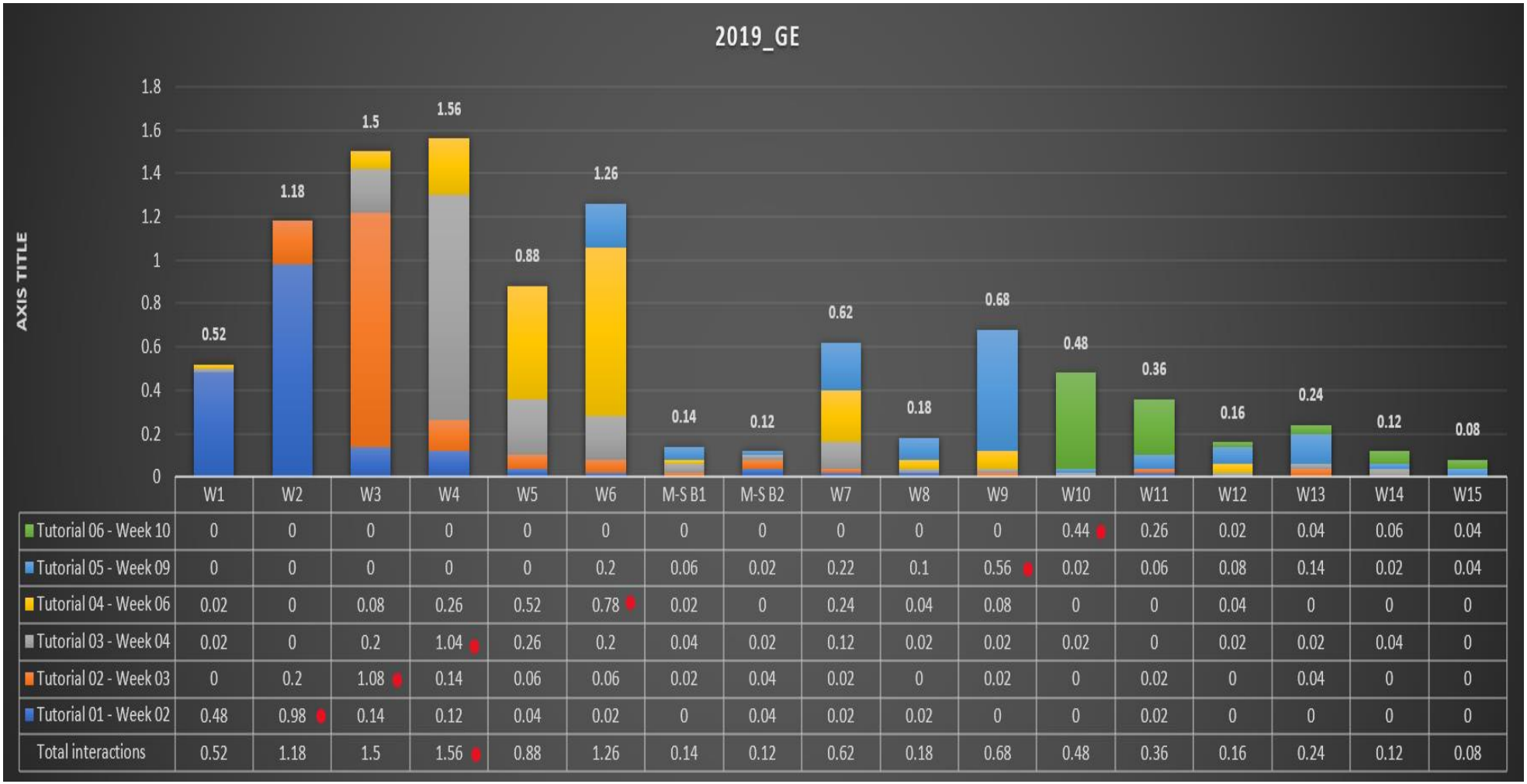
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Tutorial 06 - Week 10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.27	0.27
Tutorial 05 - Week 09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.45	0.00	0.00	0.27	0.09	0.00
Tutorial 04 - Week 06	0.00	0.00	0.00	0.00	0.00	0.73	0.09	0.36	0.18	0.09	0.00	0.00	0.00	0.00	0.27	0.00	0.00
Tutorial 03 - Week 04	0.00	0.00	1.09	1.64	0.27	0.00	0.00	0.00	0.09	0.09	0.00	0.00	0.00	0.00	0.00	0.09	0.00
Tutorial 02 - Week 03	0.09	1.00	1.73	0.18	0.18	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.09	0.00
Tutorial 01 - Week 02	1.18	2.00	0.27	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00
Total interactions	1.27	3.00	3.09	1.91	0.45	0.73	0.09	0.36	0.27	0.18	0.91	0.45	0.00	0.00	1.18	0.55	0.27

Figure 9.4. 3 Weekly IPS with tutorial files by 2018_DE



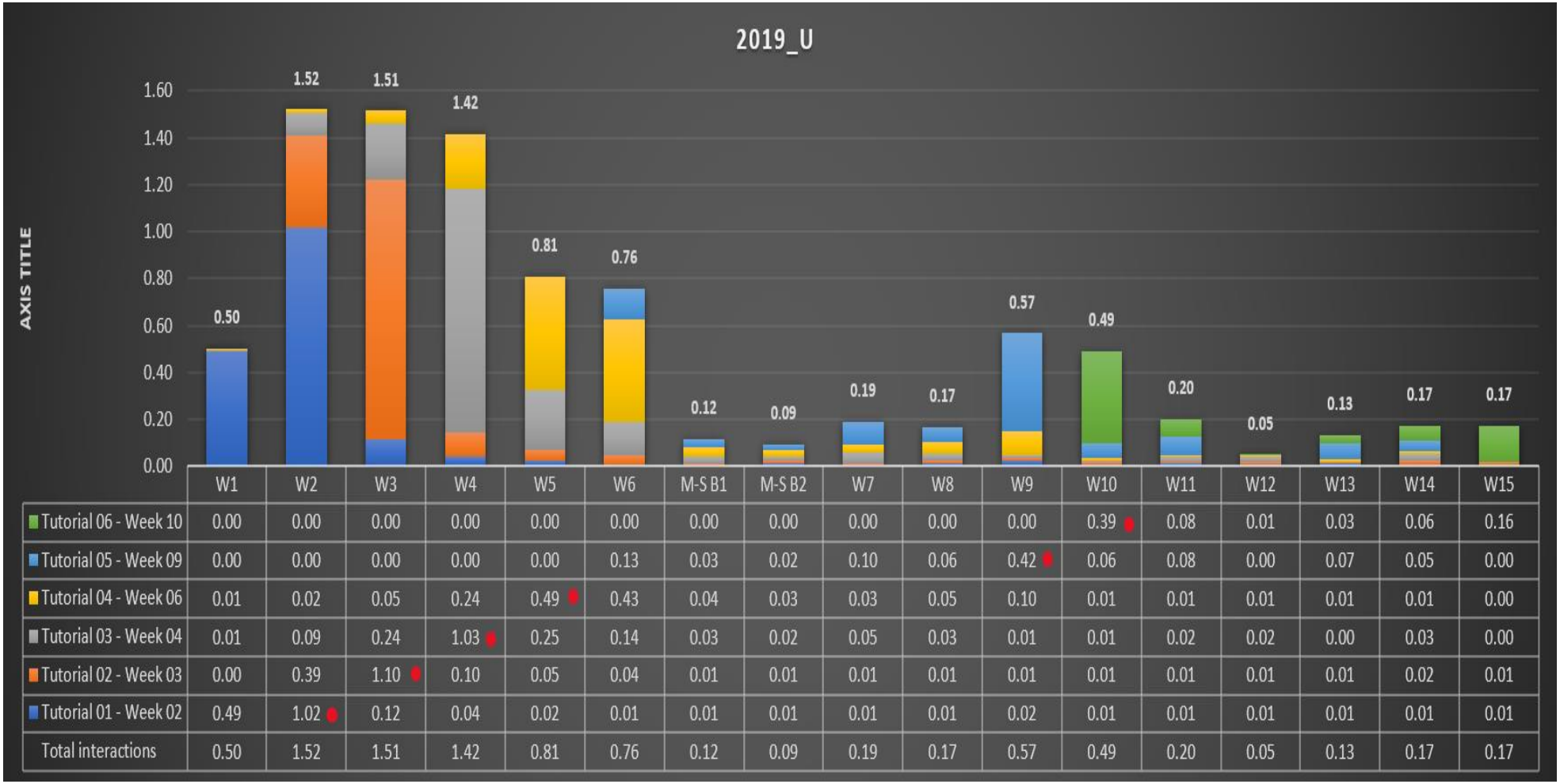
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Tutorial 06 - Week 10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.26	0.00	0.03	0.08	0.05
Tutorial 05 - Week 09	0.00	0.00	0.00	0.00	0.00	0.26	0.05	0.08	0.18	0.03	0.29	0.05	0.05	0.11	0.03	0.05	0.00
Tutorial 04 - Week 06	0.00	0.00	0.18	0.50	0.61	0.39	0.00	0.03	0.13	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.03
Tutorial 03 - Week 04	0.00	0.03	0.50	0.63	0.34	0.13	0.00	0.03	0.13	0.03	0.00	0.03	0.03	0.00	0.00	0.00	0.00
Tutorial 02 - Week 03	0.00	0.39	0.76	0.05	0.03	0.05	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.03	0.00
Tutorial 01 - Week 02	0.55	1.05	0.24	0.03	0.00	0.18	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
Total interactions	0.55	1.47	1.68	1.21	0.97	1.03	0.05	0.13	0.45	0.05	0.39	0.53	0.34	0.11	0.05	0.16	0.08

Figure 9.4. 4 Weekly IPS with tutorial files by 2019_DE



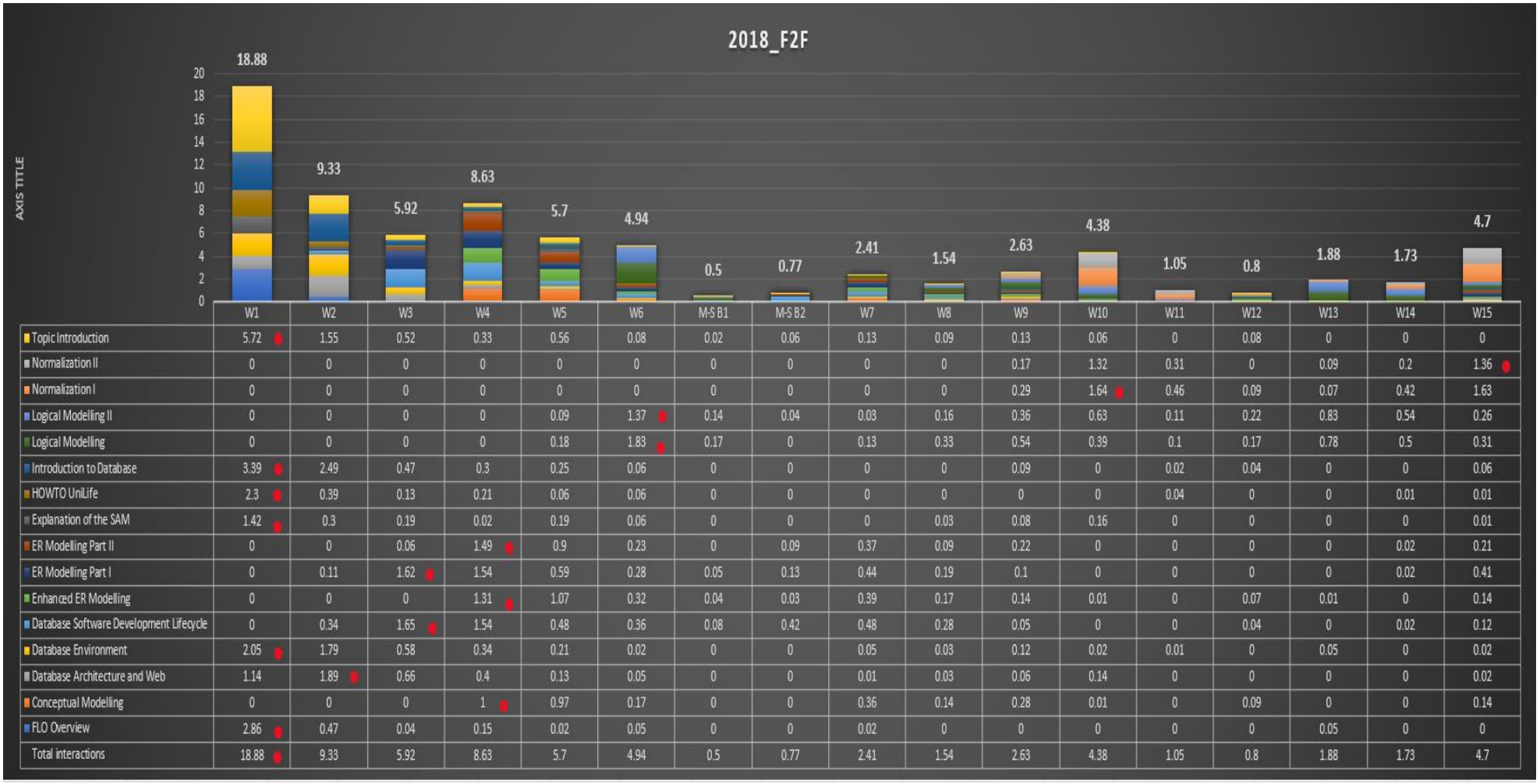
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Tutorial 06 - Week 10	0	0	0	0	0	0	0	0	0	0	0	0.44	0.26	0.02	0.04	0.06	0.04
Tutorial 05 - Week 09	0	0	0	0	0	0.2	0.06	0.02	0.22	0.1	0.56	0.02	0.06	0.08	0.14	0.02	0.04
Tutorial 04 - Week 06	0.02	0	0.08	0.26	0.52	0.78	0.02	0	0.24	0.04	0.08	0	0	0.04	0	0	0
Tutorial 03 - Week 04	0.02	0	0.2	1.04	0.26	0.2	0.04	0.02	0.12	0.02	0.02	0.02	0	0.02	0.02	0.04	0
Tutorial 02 - Week 03	0	0.2	1.08	0.14	0.06	0.06	0.02	0.04	0.02	0	0.02	0	0.02	0	0.04	0	0
Tutorial 01 - Week 02	0.48	0.98	0.14	0.12	0.04	0.02	0	0.04	0.02	0.02	0	0	0.02	0	0	0	0
Total interactions	0.52	1.18	1.5	1.56	0.88	1.26	0.14	0.12	0.62	0.18	0.68	0.48	0.36	0.16	0.24	0.12	0.08

Figure 9.4. 5 Weekly IPS with tutorial files by 2019_GE



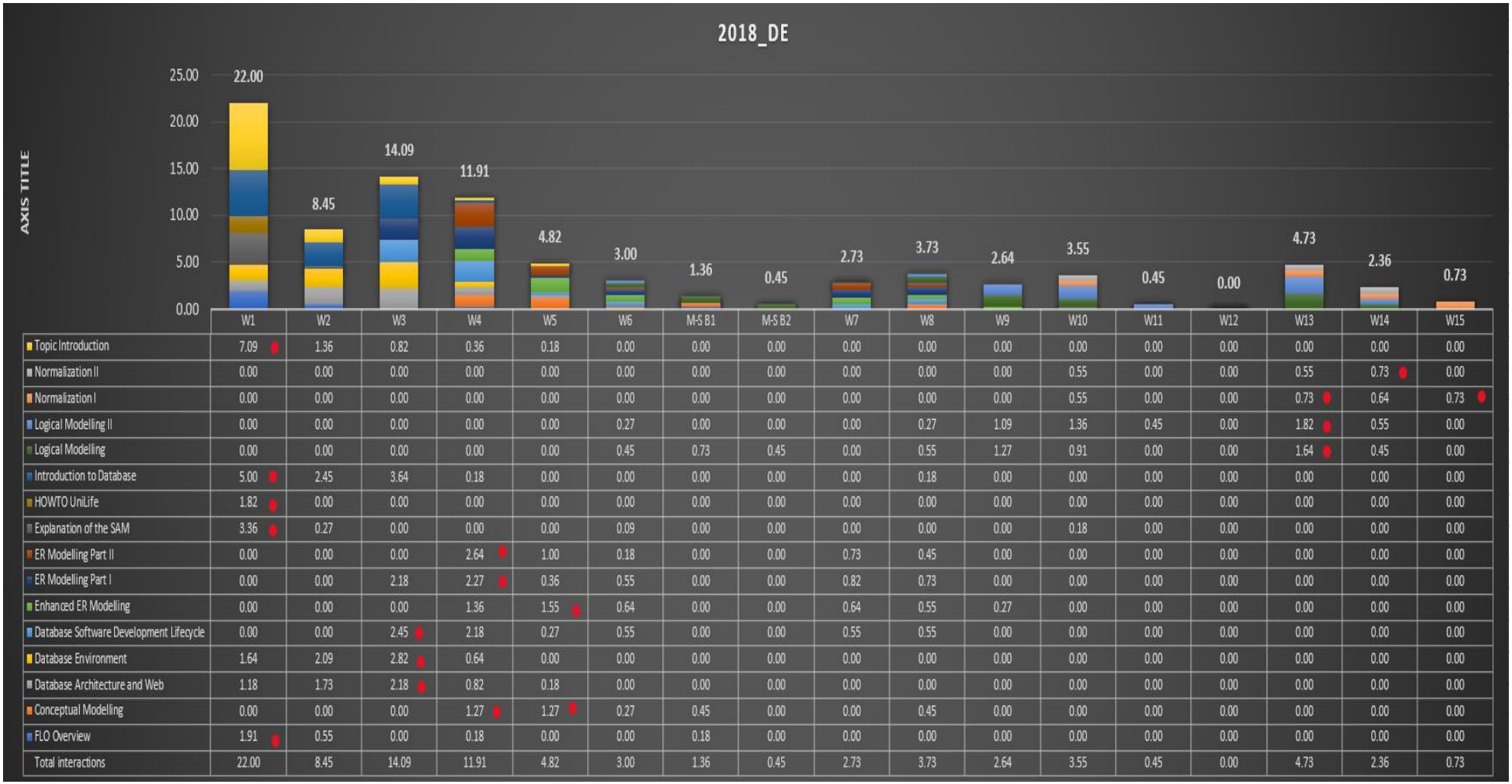
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Tutorial 06 - Week 10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.08	0.01	0.03	0.06	0.16
Tutorial 05 - Week 09	0.00	0.00	0.00	0.00	0.00	0.13	0.03	0.02	0.10	0.06	0.42	0.06	0.08	0.00	0.07	0.05	0.00
Tutorial 04 - Week 06	0.01	0.02	0.05	0.24	0.49	0.43	0.04	0.03	0.03	0.05	0.10	0.01	0.01	0.01	0.01	0.01	0.00
Tutorial 03 - Week 04	0.01	0.09	0.24	1.03	0.25	0.14	0.03	0.02	0.05	0.03	0.01	0.01	0.02	0.02	0.00	0.03	0.00
Tutorial 02 - Week 03	0.00	0.39	1.10	0.10	0.05	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01
Tutorial 01 - Week 02	0.49	1.02	0.12	0.04	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01
Total interactions	0.50	1.52	1.51	1.42	0.81	0.76	0.12	0.09	0.19	0.17	0.57	0.49	0.20	0.05	0.13	0.17	0.17

Figure 9.4. 6 Weekly IPS with tutorial files by 2019_U



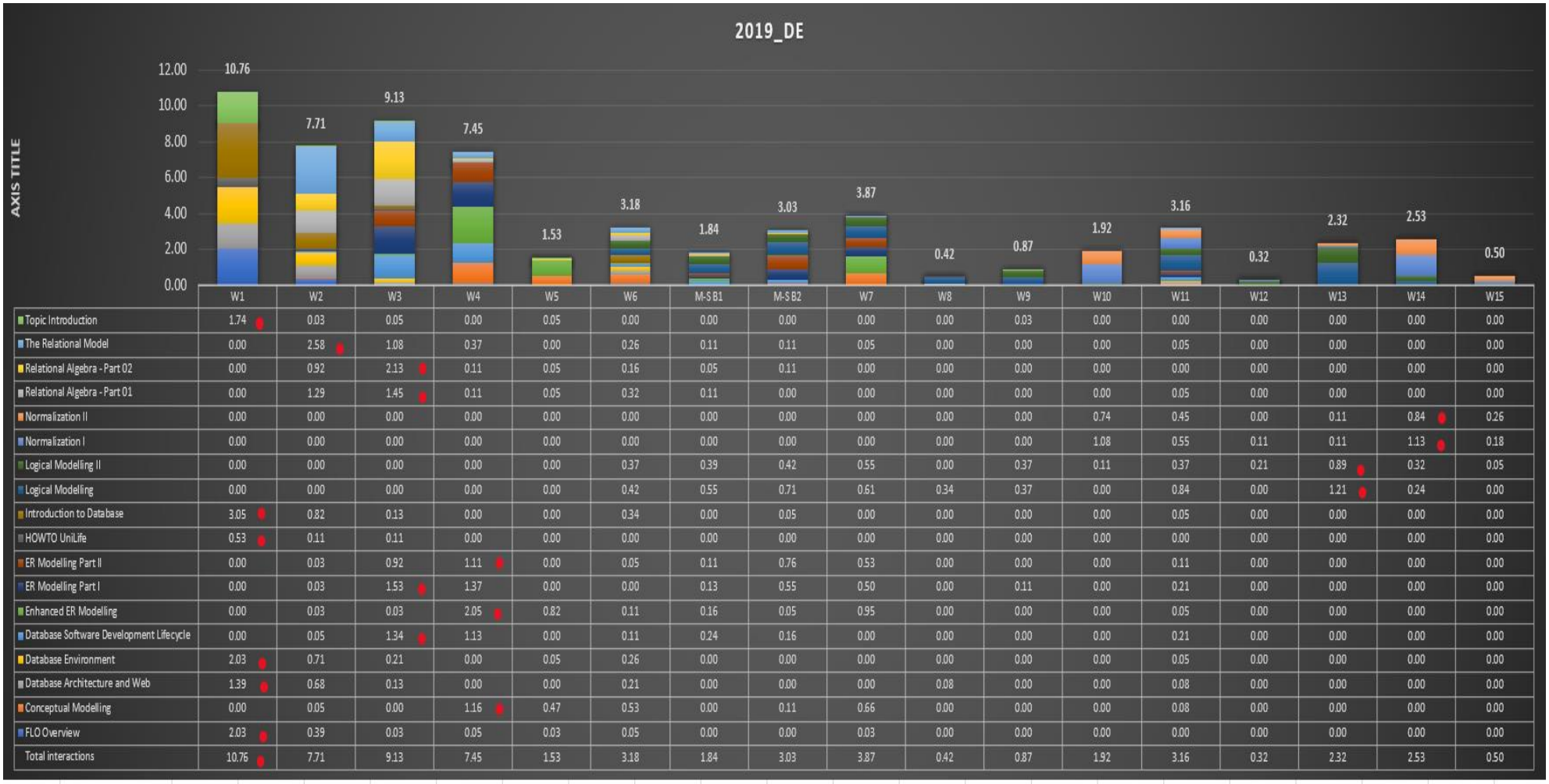
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Topic Introduction	5.72	1.55	0.52	0.33	0.56	0.08	0.02	0.06	0.13	0.09	0.13	0.06	0	0.08	0	0	0
Normalization II	0	0	0	0	0	0	0	0	0	0	0.17	1.32	0.31	0	0.09	0.2	1.36
Normalization I	0	0	0	0	0	0	0	0	0	0	0.29	1.64	0.46	0.09	0.07	0.42	1.63
Logical Modelling II	0	0	0	0	0.09	1.37	0.14	0.04	0.03	0.16	0.36	0.63	0.11	0.22	0.83	0.54	0.26
Logical Modelling	0	0	0	0	0.18	1.83	0.17	0	0.13	0.33	0.54	0.39	0.1	0.17	0.78	0.5	0.31
Introduction to Database	3.39	2.49	0.47	0.3	0.25	0.06	0	0	0	0	0.09	0	0.02	0.04	0	0	0.06
HOWTO UniLife	2.3	0.39	0.13	0.21	0.06	0.06	0	0	0	0	0	0	0.04	0	0	0.01	0.01
Explanation of the SAM	1.42	0.3	0.19	0.02	0.19	0.06	0	0	0	0.03	0.08	0.16	0	0	0	0	0.01
ER Modelling Part II	0	0	0.06	1.49	0.9	0.23	0	0.09	0.37	0.09	0.22	0	0	0	0	0.02	0.21
ER Modelling Part I	0	0.11	1.62	1.54	0.59	0.28	0.05	0.13	0.44	0.19	0.1	0	0	0	0	0.02	0.41
Enhanced ER Modelling	0	0	0	1.31	1.07	0.32	0.04	0.03	0.39	0.17	0.14	0.01	0	0.07	0.01	0	0.14
Database Software Development Lifecycle	0	0.34	1.65	1.54	0.48	0.36	0.08	0.42	0.48	0.28	0.05	0	0	0.04	0	0.02	0.12
Database Environment	2.05	1.79	0.58	0.34	0.21	0.02	0	0	0.05	0.03	0.12	0.02	0.01	0	0.05	0	0.02
Database Architecture and Web	1.14	1.89	0.66	0.4	0.13	0.05	0	0	0.01	0.03	0.06	0.14	0	0	0	0	0.02
Conceptual Modelling	0	0	0	1	0.97	0.17	0	0	0.36	0.14	0.28	0.01	0	0.09	0	0	0.14
FLO Overview	2.86	0.47	0.04	0.15	0.02	0.05	0	0	0.02	0	0	0	0	0	0.05	0	0
Total interactions	18.88	9.33	5.92	8.63	5.7	4.94	0.5	0.77	2.41	1.54	2.63	4.38	1.05	0.8	1.88	1.73	4.7

Figure 9.4. 7 Weekly IPS with theoretical course material's videos by 2018_F2F



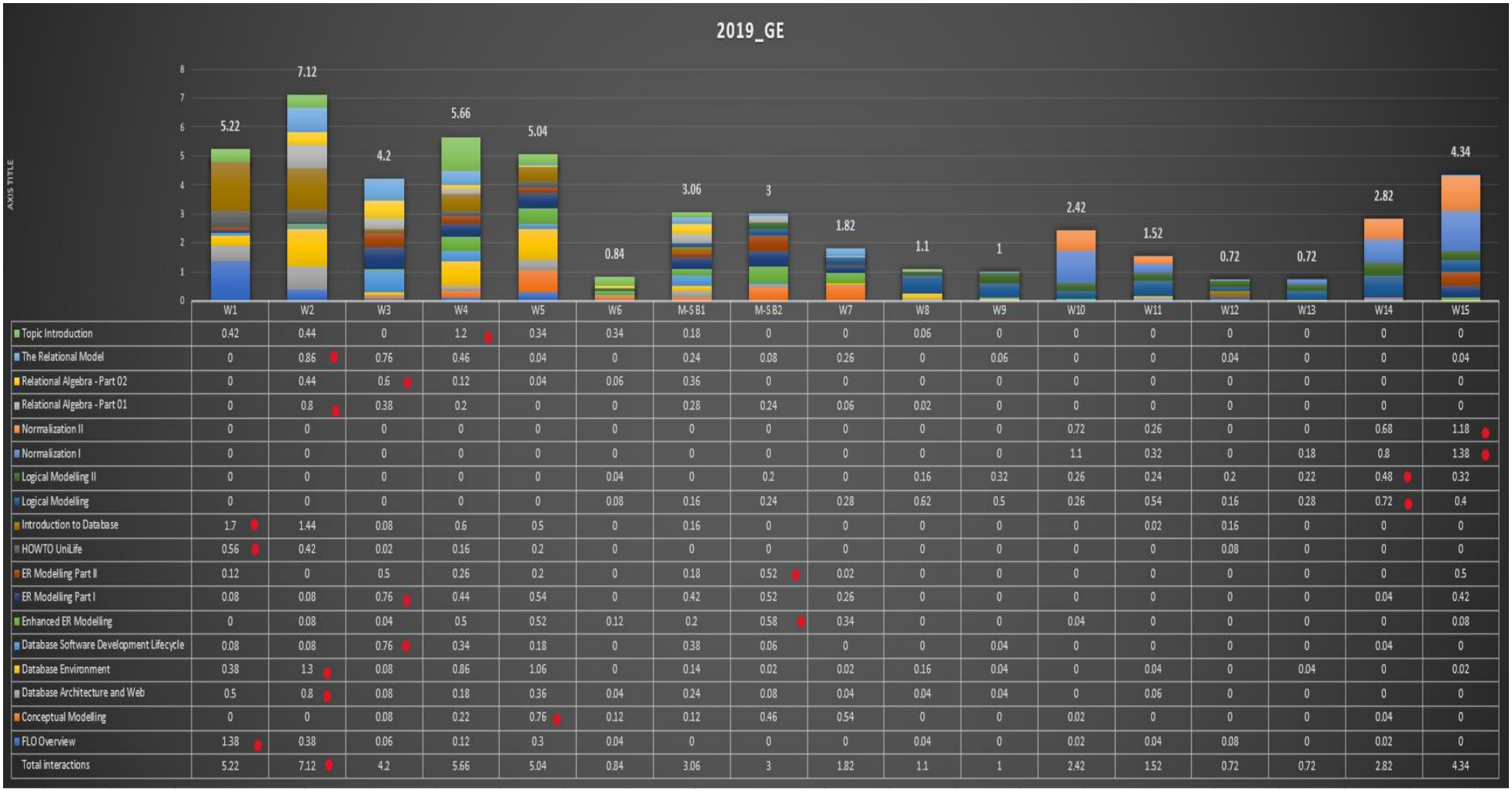
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Topic Introduction	7.09	1.36	0.82	0.36	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Normalization II	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.00	0.55	0.73	0.00
Normalization I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.00	0.73	0.64	0.73
Logical Modelling II	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.27	1.09	1.36	0.45	0.00	1.82	0.55	0.00
Logical Modelling	0.00	0.00	0.00	0.00	0.00	0.45	0.73	0.45	0.00	0.55	1.27	0.91	0.00	0.00	1.64	0.45	0.00
Introduction to Database	5.00	2.45	3.64	0.18	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HOWTO UniLife	1.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Explanation of the SAM	3.36	0.27	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00
ER Modelling Part II	0.00	0.00	0.00	2.64	1.00	0.18	0.00	0.00	0.73	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ER Modelling Part I	0.00	0.00	2.18	2.27	0.36	0.55	0.00	0.00	0.82	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Enhanced ER Modelling	0.00	0.00	0.00	1.36	1.55	0.64	0.00	0.00	0.64	0.55	0.27	0.00	0.00	0.00	0.00	0.00	0.00
Database Software Development Lifecycle	0.00	0.00	2.45	2.18	0.27	0.55	0.00	0.00	0.55	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Database Environment	1.64	2.09	2.82	0.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Database Architecture and Web	1.18	1.73	2.18	0.82	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Conceptual Modelling	0.00	0.00	0.00	1.27	1.27	0.27	0.45	0.00	0.00	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FLO Overview	1.91	0.55	0.00	0.18	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total interactions	22.00	8.45	14.09	11.91	4.82	3.00	1.36	0.45	2.73	3.73	2.64	3.55	0.45	0.00	4.73	2.36	0.73

Figure 9.4. 8 Weekly IPS with theoretical course material's videos by 2018_DE



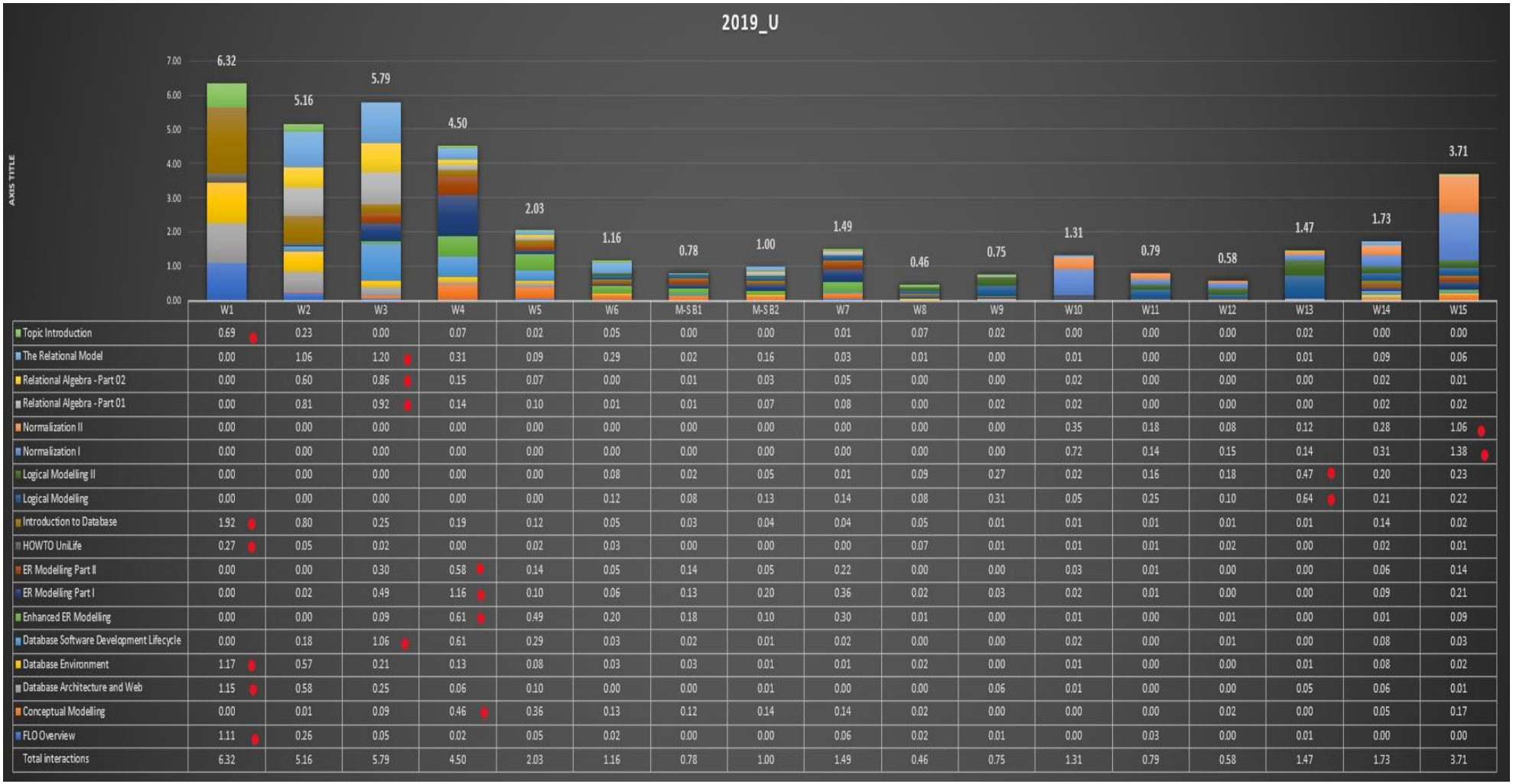
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Topic Introduction	1.74	0.03	0.05	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00
The Relational Model	0.00	2.58	1.08	0.37	0.00	0.26	0.11	0.11	0.05	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00
Relational Algebra - Part 02	0.00	0.92	2.13	0.11	0.05	0.16	0.05	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Relational Algebra - Part 01	0.00	1.29	1.45	0.11	0.05	0.32	0.11	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00
Normalization II	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.45	0.00	0.11	0.84	0.26
Normalization I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.08	0.55	0.11	0.11	1.13	0.18
Logical Modelling II	0.00	0.00	0.00	0.00	0.00	0.37	0.39	0.42	0.55	0.00	0.37	0.11	0.37	0.21	0.89	0.32	0.05
Logical Modelling	0.00	0.00	0.00	0.00	0.00	0.42	0.55	0.71	0.61	0.34	0.37	0.00	0.84	0.00	1.21	0.24	0.00
Introduction to Database	3.05	0.82	0.13	0.00	0.00	0.34	0.00	0.05	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00
HOWTO UniLife	0.53	0.11	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ER Modelling Part II	0.00	0.03	0.92	1.11	0.00	0.05	0.11	0.76	0.53	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00
ER Modelling Part I	0.00	0.03	1.53	1.37	0.00	0.00	0.13	0.55	0.50	0.00	0.11	0.00	0.21	0.00	0.00	0.00	0.00
Enhanced ER Modelling	0.00	0.03	0.03	2.05	0.82	0.11	0.16	0.05	0.95	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00
Database Software Development Lifecycle	0.00	0.05	1.34	1.13	0.00	0.11	0.24	0.16	0.00	0.00	0.00	0.00	0.21	0.00	0.00	0.00	0.00
Database Environment	2.03	0.71	0.21	0.00	0.05	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00
Database Architecture and Web	1.39	0.68	0.13	0.00	0.00	0.21	0.00	0.00	0.00	0.08	0.00	0.00	0.08	0.00	0.00	0.00	0.00
Conceptual Modelling	0.00	0.05	0.00	1.16	0.47	0.53	0.00	0.11	0.66	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00
FLO Overview	2.03	0.39	0.03	0.05	0.03	0.05	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total interactions	10.76	7.71	9.13	7.45	1.53	3.18	1.84	3.03	3.87	0.42	0.87	1.92	3.16	0.32	2.32	2.53	0.50

Figure 9.4. 9 Weekly IPS with theoretical course material's videos by 2019_DE



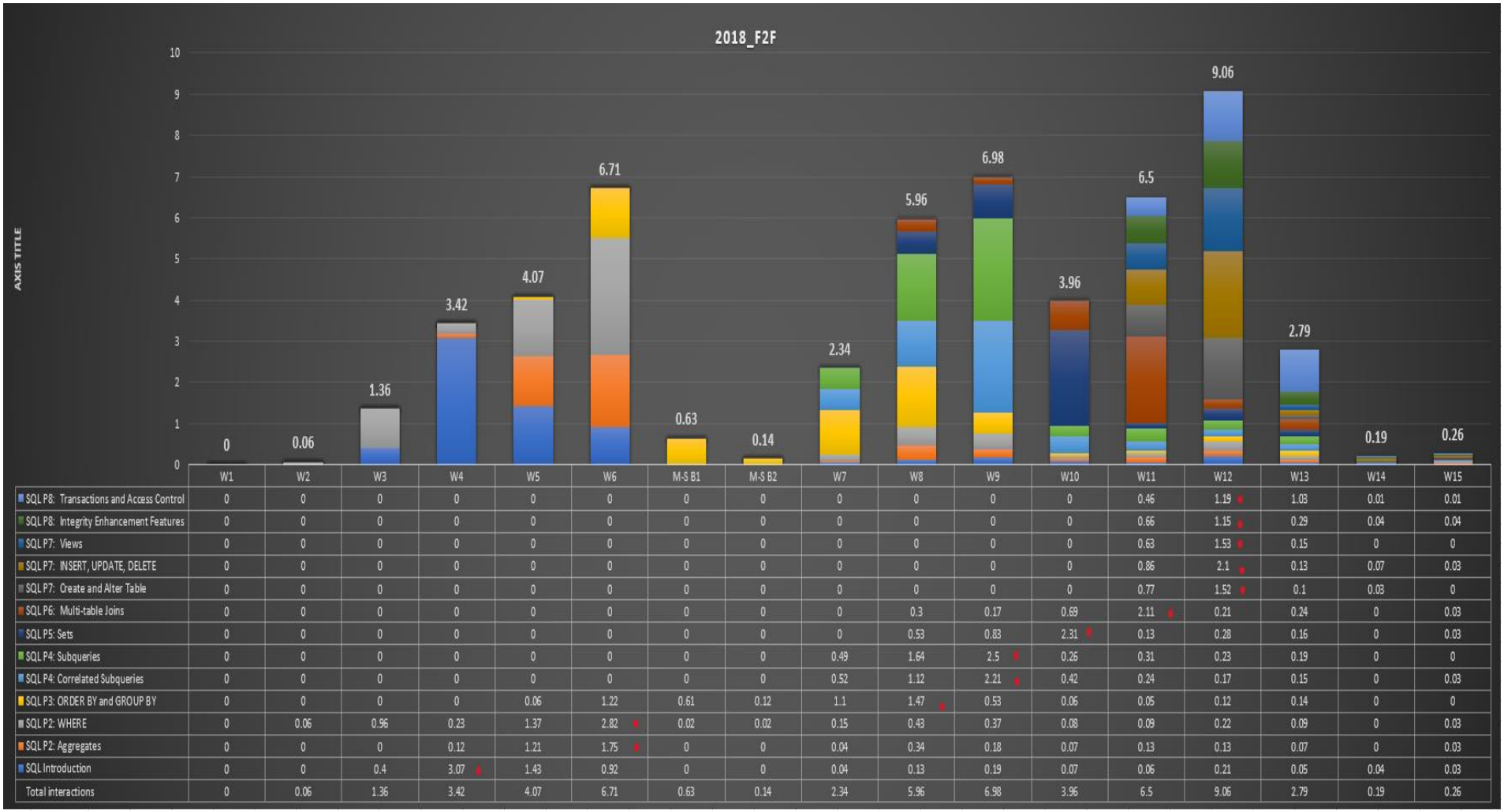
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Topic Introduction	0.42	0.44	0	1.2	0.34	0.34	0.18	0	0	0.06	0	0	0	0	0	0	0
The Relational Model	0	0.86	0.76	0.46	0.04	0	0.24	0.08	0.26	0	0.06	0	0	0.04	0	0	0.04
Relational Algebra - Part 02	0	0.44	0.6	0.12	0.04	0.06	0.36	0	0	0	0	0	0	0	0	0	0
Relational Algebra - Part 01	0	0.8	0.38	0.2	0	0	0.28	0.24	0.06	0.02	0	0	0	0	0	0	0
Normalization II	0	0	0	0	0	0	0	0	0	0	0	0.72	0.26	0	0	0.68	1.18
Normalization I	0	0	0	0	0	0	0	0	0	0	0	1.1	0.32	0	0.18	0.8	1.38
Logical Modelling II	0	0	0	0	0	0.04	0	0.2	0	0.16	0.32	0.26	0.24	0.2	0.22	0.48	0.32
Logical Modelling	0	0	0	0	0	0.08	0.16	0.24	0.28	0.62	0.5	0.26	0.54	0.16	0.28	0.72	0.4
Introduction to Database	1.7	1.44	0.08	0.6	0.5	0	0.16	0	0	0	0	0	0.02	0.16	0	0	0
HOWTO UniLife	0.56	0.42	0.02	0.16	0.2	0	0	0	0	0	0	0	0	0.08	0	0	0
ER Modelling Part II	0.12	0	0.5	0.26	0.2	0	0.18	0.52	0.02	0	0	0	0	0	0	0	0.5
ER Modelling Part I	0.08	0.08	0.76	0.44	0.54	0	0.42	0.52	0.26	0	0	0	0	0	0	0.04	0.42
Enhanced ER Modelling	0	0.08	0.04	0.5	0.52	0.12	0.2	0.58	0.34	0	0	0.04	0	0	0	0	0.08
Database Software Development Lifecycle	0.08	0.08	0.76	0.34	0.18	0	0.38	0.06	0	0	0.04	0	0	0	0	0.04	0
Database Environment	0.38	1.3	0.08	0.86	1.06	0	0.14	0.02	0.02	0.16	0.04	0	0.04	0	0.04	0	0.02
Database Architecture and Web	0.5	0.8	0.08	0.18	0.36	0.04	0.24	0.08	0.04	0.04	0.04	0	0.06	0	0	0	0
Conceptual Modelling	0	0	0.08	0.22	0.76	0.12	0.12	0.46	0.54	0	0	0.02	0	0	0	0.04	0
FLO Overview	1.38	0.38	0.06	0.12	0.3	0.04	0	0	0	0.04	0	0.02	0.04	0.08	0	0.02	0
Total interactions	5.22	7.12	4.2	5.66	5.04	0.84	3.06	3	1.82	1.1	1	2.42	1.52	0.72	0.72	2.82	4.34

Figure 9.4. 10 Weekly IPS with theoretical course material's videos by 2019_GE



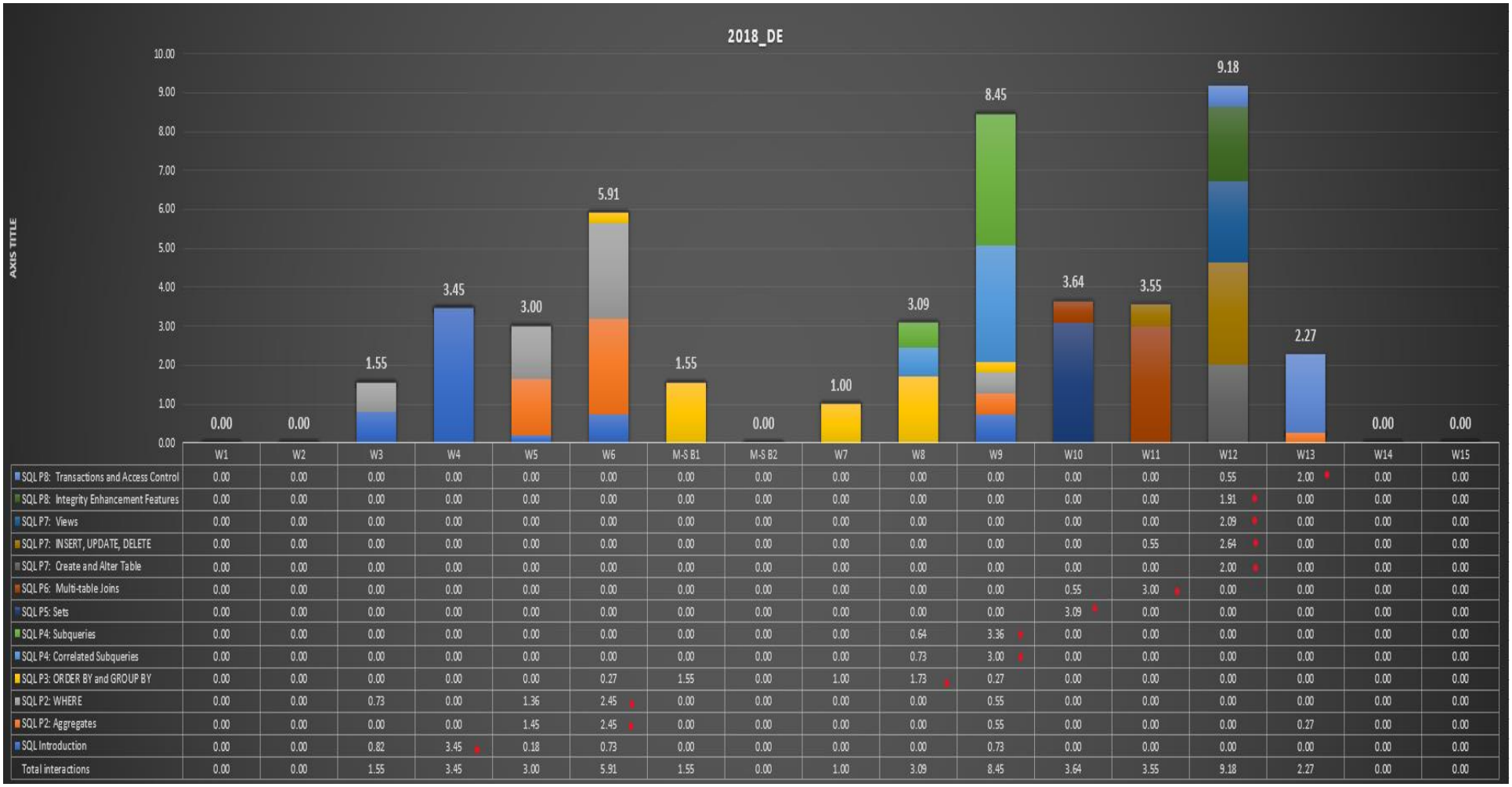
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Topic Introduction	0.69	0.23	0.00	0.07	0.02	0.05	0.00	0.00	0.01	0.07	0.02	0.00	0.00	0.00	0.02	0.00	0.00
The Relational Model	0.00	1.06	1.20	0.31	0.09	0.29	0.02	0.16	0.03	0.01	0.00	0.01	0.00	0.00	0.01	0.09	0.06
Relational Algebra - Part 02	0.00	0.60	0.86	0.15	0.07	0.00	0.01	0.03	0.05	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.01
Relational Algebra - Part 01	0.00	0.81	0.92	0.14	0.10	0.01	0.01	0.07	0.08	0.00	0.02	0.02	0.00	0.00	0.00	0.02	0.02
Normalization II	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.18	0.08	0.12	0.28	1.06
Normalization I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.72	0.14	0.15	0.14	0.31	1.38
Logical Modelling II	0.00	0.00	0.00	0.00	0.00	0.08	0.02	0.05	0.01	0.09	0.27	0.02	0.16	0.18	0.47	0.20	0.23
Logical Modelling	0.00	0.00	0.00	0.00	0.00	0.12	0.08	0.13	0.14	0.08	0.31	0.05	0.25	0.10	0.64	0.21	0.22
Introduction to Database	1.92	0.80	0.25	0.19	0.12	0.05	0.03	0.04	0.04	0.05	0.01	0.01	0.01	0.01	0.01	0.14	0.02
HOWTO UniLife	0.27	0.05	0.02	0.00	0.02	0.03	0.00	0.00	0.00	0.07	0.01	0.01	0.01	0.02	0.00	0.02	0.01
ER Modelling Part II	0.00	0.00	0.30	0.58	0.14	0.05	0.14	0.05	0.22	0.00	0.00	0.03	0.01	0.00	0.00	0.06	0.14
ER Modelling Part I	0.00	0.02	0.49	1.16	0.10	0.06	0.13	0.20	0.36	0.02	0.03	0.02	0.01	0.00	0.00	0.09	0.21
Enhanced ER Modelling	0.00	0.00	0.09	0.61	0.49	0.20	0.18	0.10	0.30	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.09
Database Software Development Lifecycle	0.00	0.18	1.06	0.61	0.29	0.03	0.02	0.01	0.02	0.00	0.00	0.02	0.00	0.01	0.00	0.08	0.03
Database Environment	1.17	0.57	0.21	0.13	0.08	0.03	0.03	0.01	0.01	0.02	0.00	0.01	0.00	0.00	0.01	0.08	0.02
Database Architecture and Web	1.15	0.58	0.25	0.06	0.10	0.00	0.00	0.01	0.00	0.00	0.06	0.01	0.00	0.00	0.05	0.06	0.01
Conceptual Modelling	0.00	0.01	0.09	0.46	0.36	0.13	0.12	0.14	0.14	0.02	0.00	0.00	0.00	0.02	0.00	0.05	0.17
FLO Overview	1.11	0.26	0.05	0.02	0.05	0.02	0.00	0.00	0.06	0.02	0.01	0.00	0.03	0.00	0.01	0.00	0.00
Total interactions	6.32	5.16	5.79	4.50	2.03	1.16	0.78	1.00	1.49	0.46	0.75	1.31	0.79	0.58	1.47	1.73	3.71

Figure 9.4. 11 Weekly IPS with theoretical course material's videos by 2019_U



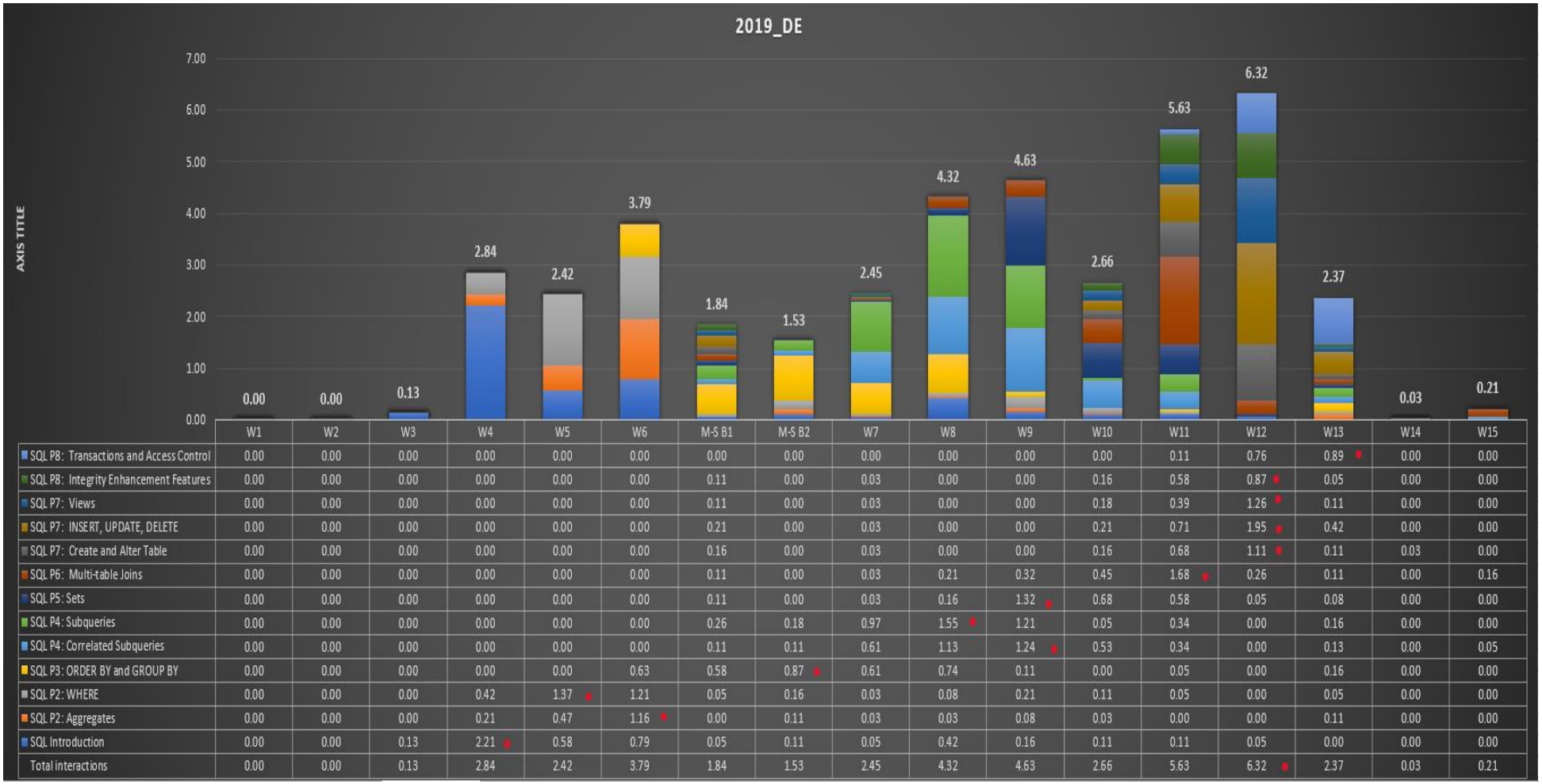
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
SQL P8: Transactions and Access Control	0	0	0	0	0	0	0	0	0	0	0	0	0.46	1.19	1.03	0.01	0.01
SQL P8: Integrity Enhancement Features	0	0	0	0	0	0	0	0	0	0	0	0	0.66	1.15	0.29	0.04	0.04
SQL P7: Views	0	0	0	0	0	0	0	0	0	0	0	0	0.63	1.53	0.15	0	0
SQL P7: INSERT, UPDATE, DELETE	0	0	0	0	0	0	0	0	0	0	0	0	0.86	2.1	0.13	0.07	0.03
SQL P7: Create and Alter Table	0	0	0	0	0	0	0	0	0	0	0	0	0.77	1.52	0.1	0.03	0
SQL P6: Multi-table Joins	0	0	0	0	0	0	0	0	0	0.3	0.17	0.69	2.11	0.21	0.24	0	0.03
SQL P5: Sets	0	0	0	0	0	0	0	0	0	0.53	0.83	2.31	0.13	0.28	0.16	0	0.03
SQL P4: Subqueries	0	0	0	0	0	0	0	0	0.49	1.64	2.5	0.26	0.31	0.23	0.19	0	0
SQL P4: Correlated Subqueries	0	0	0	0	0	0	0	0	0.52	1.12	2.21	0.42	0.24	0.17	0.15	0	0.03
SQL P3: ORDER BY and GROUP BY	0	0	0	0	0.06	1.22	0.61	0.12	1.1	1.47	0.53	0.06	0.05	0.12	0.14	0	0
SQL P2: WHERE	0	0.06	0.96	0.23	1.37	2.82	0.02	0.02	0.15	0.43	0.37	0.08	0.09	0.22	0.09	0	0.03
SQL P2: Aggregates	0	0	0	0.12	1.21	1.75	0	0	0.04	0.34	0.18	0.07	0.13	0.13	0.07	0	0.03
SQL Introduction	0	0	0.4	3.07	1.43	0.92	0	0	0.04	0.13	0.19	0.07	0.06	0.21	0.05	0.04	0.03
Total interactions	0	0.06	1.36	3.42	4.07	6.71	0.63	0.14	2.34	5.96	6.98	3.96	6.5	9.06	2.79	0.19	0.26

Figure 9.4. 12 Weekly IPS with practical course material's videos by 2018_F2F



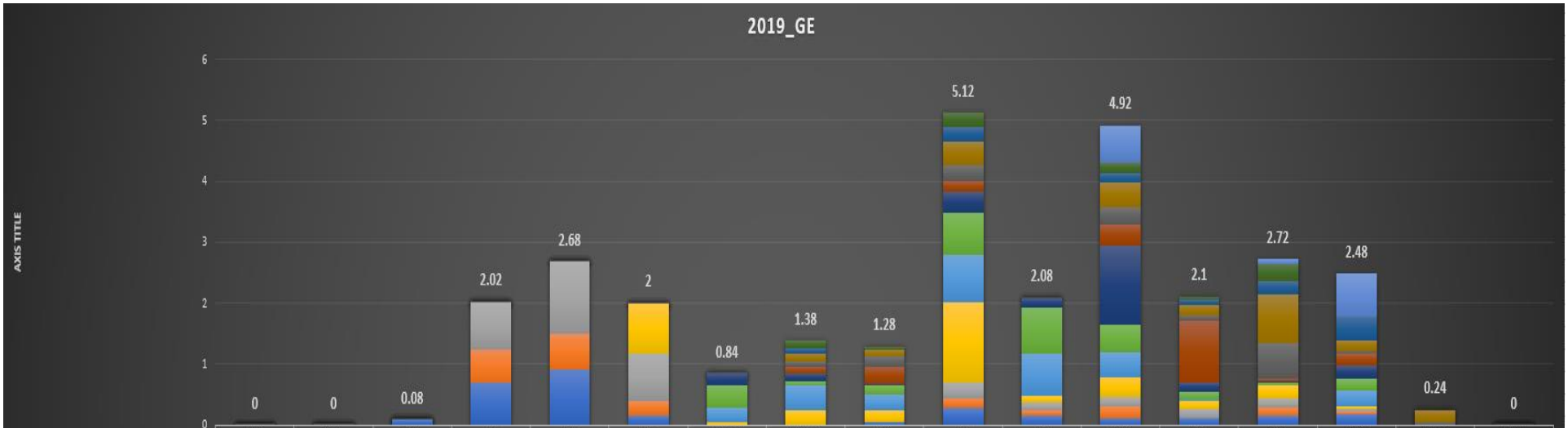
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
SQL P8: Transactions and Access Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	2.00	0.00	0.00
SQL P8: Integrity Enhancement Features	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.91	0.00	0.00	0.00
SQL P7: Views	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.09	0.00	0.00	0.00
SQL P7: INSERT, UPDATE, DELETE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	2.64	0.00	0.00	0.00
SQL P7: Create and Alter Table	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00
SQL P6: Multi-table Joins	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	3.00	0.00	0.00	0.00	0.00
SQL P5: Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.09	0.00	0.00	0.00	0.00	0.00
SQL P4: Subqueries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	3.36	0.00	0.00	0.00	0.00	0.00	0.00
SQL P4: Correlated Subqueries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	3.00	0.00	0.00	0.00	0.00	0.00	0.00
SQL P3: ORDER BY and GROUP BY	0.00	0.00	0.00	0.00	0.00	0.27	1.55	0.00	1.00	1.73	0.27	0.00	0.00	0.00	0.00	0.00	0.00
SQL P2: WHERE	0.00	0.00	0.73	0.00	1.36	2.45	0.00	0.00	0.00	0.00	0.55	0.00	0.00	0.00	0.00	0.00	0.00
SQL P2: Aggregates	0.00	0.00	0.00	0.00	1.45	2.45	0.00	0.00	0.00	0.00	0.55	0.00	0.00	0.00	0.27	0.00	0.00
SQL Introduction	0.00	0.00	0.82	3.45	0.18	0.73	0.00	0.00	0.00	0.00	0.73	0.00	0.00	0.00	0.00	0.00	0.00
Total interactions	0.00	0.00	1.55	3.45	3.00	5.91	1.55	0.00	1.00	3.09	8.45	3.64	3.55	9.18	2.27	0.00	0.00

Figure 9.4. 13 Weekly IPS with practical course material's videos by 2018_DE



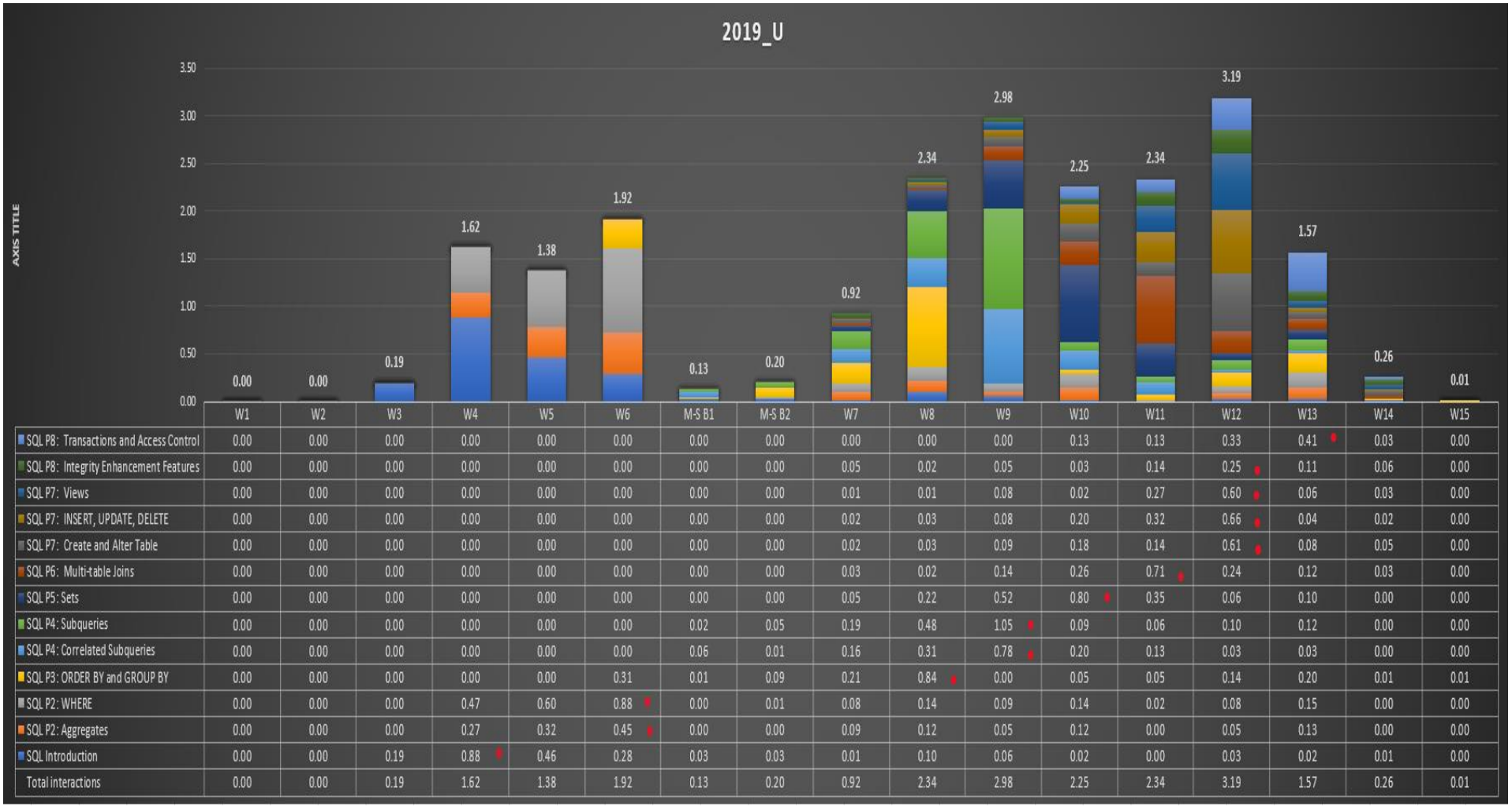
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
SQL P8: Transactions and Access Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.76	0.89	0.00	0.00
SQL P8: Integrity Enhancement Features	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.03	0.00	0.00	0.16	0.58	0.87	0.05	0.00	0.00
SQL P7: Views	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.03	0.00	0.00	0.18	0.39	1.26	0.11	0.00	0.00
SQL P7: INSERT, UPDATE, DELETE	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.03	0.00	0.00	0.21	0.71	1.95	0.42	0.00	0.00
SQL P7: Create and Alter Table	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.00	0.03	0.00	0.00	0.16	0.68	1.11	0.11	0.03	0.00
SQL P6: Multi-table Joins	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.03	0.21	0.32	0.45	1.68	0.26	0.11	0.00	0.16
SQL P5: Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.03	0.16	1.32	0.68	0.58	0.05	0.08	0.00	0.00
SQL P4: Subqueries	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.18	0.97	1.55	1.21	0.05	0.34	0.00	0.16	0.00	0.00
SQL P4: Correlated Subqueries	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.11	0.61	1.13	1.24	0.53	0.34	0.00	0.13	0.00	0.05
SQL P3: ORDER BY and GROUP BY	0.00	0.00	0.00	0.00	0.00	0.63	0.58	0.87	0.61	0.74	0.11	0.00	0.05	0.00	0.16	0.00	0.00
SQL P2: WHERE	0.00	0.00	0.00	0.42	1.37	1.21	0.05	0.16	0.03	0.08	0.21	0.11	0.05	0.00	0.05	0.00	0.00
SQL P2: Aggregates	0.00	0.00	0.00	0.21	0.47	1.16	0.00	0.11	0.03	0.03	0.08	0.03	0.00	0.00	0.11	0.00	0.00
SQL Introduction	0.00	0.00	0.13	2.21	0.58	0.79	0.05	0.11	0.05	0.42	0.16	0.11	0.11	0.05	0.00	0.00	0.00
Total interactions	0.00	0.00	0.13	2.84	2.42	3.79	1.84	1.53	2.45	4.32	4.63	2.66	5.63	6.32	2.37	0.03	0.21

Figure 9.4. 14 Weekly IPS with practical course material's videos by 2019_DE



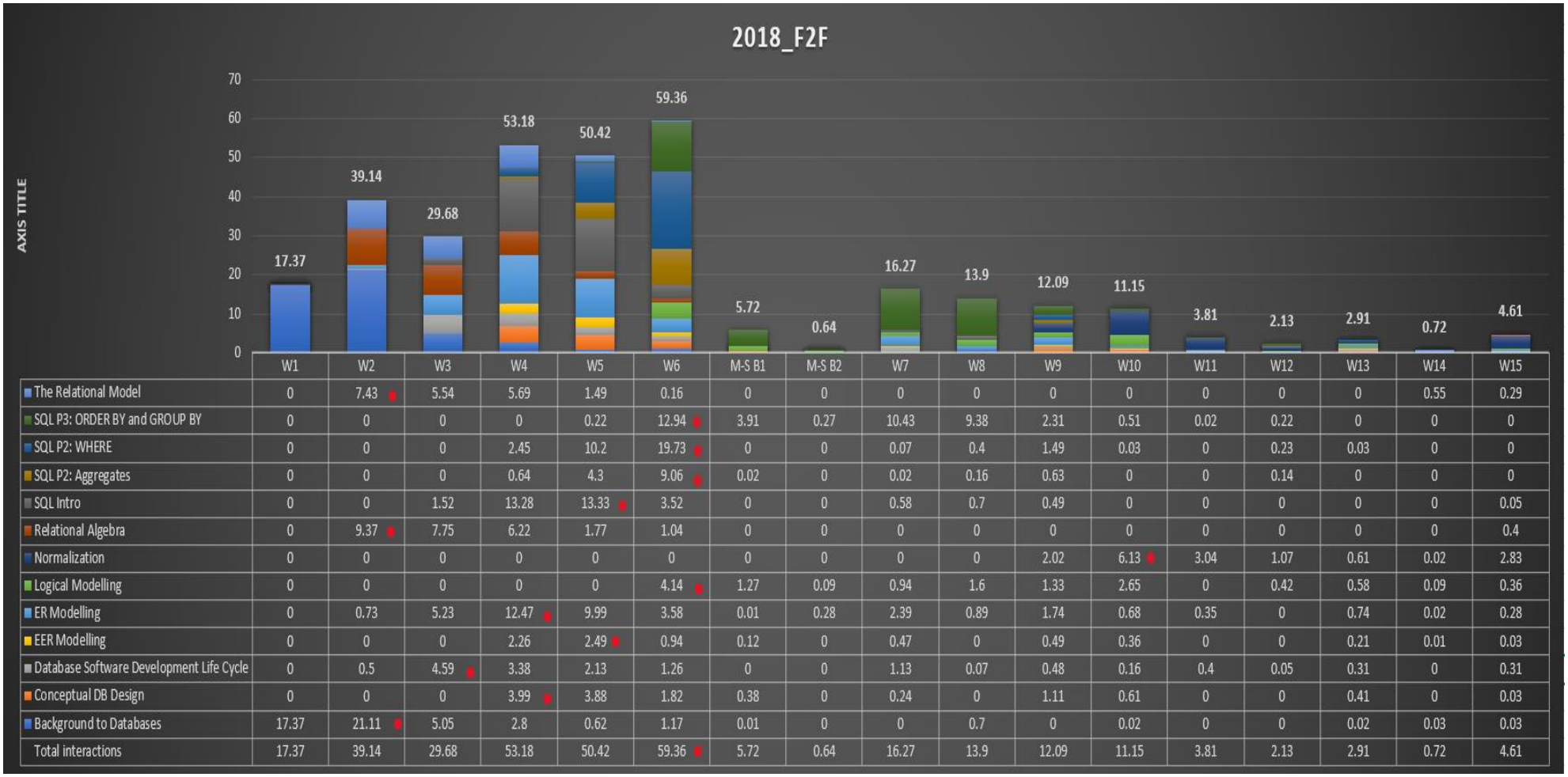
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
SQL P8: Transactions and Access Control	0	0	0	0	0	0	0	0	0	0	0	0.62	0	0.08	0.7	0	0
SQL P8: Integrity Enhancement Features	0	0	0	0	0	0	0	0.12	0.04	0.24	0	0.16	0.04	0.28	0	0	0
SQL P7: Views	0	0	0	0	0	0	0	0.08	0	0.22	0	0.16	0.08	0.22	0.4	0	0
SQL P7: INSERT, UPDATE, DELETE	0	0	0	0	0	0	0	0.14	0.12	0.4	0	0.42	0.18	0.8	0.16	0.2	0
SQL P7: Create and Alter Table	0	0	0	0	0	0	0	0.08	0.16	0.26	0	0.26	0.08	0.58	0.04	0.04	0
SQL P6: Multi-table Joins	0	0	0	0	0	0	0	0.12	0.28	0.16	0	0.36	1.02	0.04	0.2	0	0
SQL P5: Sets	0	0	0	0	0	0	0.18	0.12	0.02	0.36	0.16	1.3	0.16	0.02	0.22	0	0
SQL P4: Subqueries	0	0	0	0	0	0	0.38	0.08	0.16	0.68	0.74	0.44	0.12	0.04	0.2	0	0
SQL P4: Correlated Subqueries	0	0	0	0	0	0	0.24	0.4	0.26	0.78	0.7	0.42	0.04	0	0.26	0	0
SQL P3: ORDER BY and GROUP BY	0	0	0	0	0	0.84	0.04	0.24	0.2	1.32	0.12	0.32	0.12	0.22	0.04	0	0
SQL P2: WHERE	0	0	0	0.78	1.18	0.76	0	0	0	0.26	0.12	0.16	0.16	0.16	0.04	0	0
SQL P2: Aggregates	0	0	0	0.54	0.6	0.24	0	0	0	0.16	0.08	0.18	0	0.12	0.04	0	0
SQL Introduction	0	0	0.08	0.7	0.9	0.16	0	0	0.04	0.28	0.16	0.12	0.1	0.16	0.18	0	0
Total interactions	0	0	0.08	2.02	2.68	2	0.84	1.38	1.28	5.12	2.08	4.92	2.1	2.72	2.48	0.24	0

Figure 9.4. 15 Weekly IPS with practical course material's videos by 2019_GE



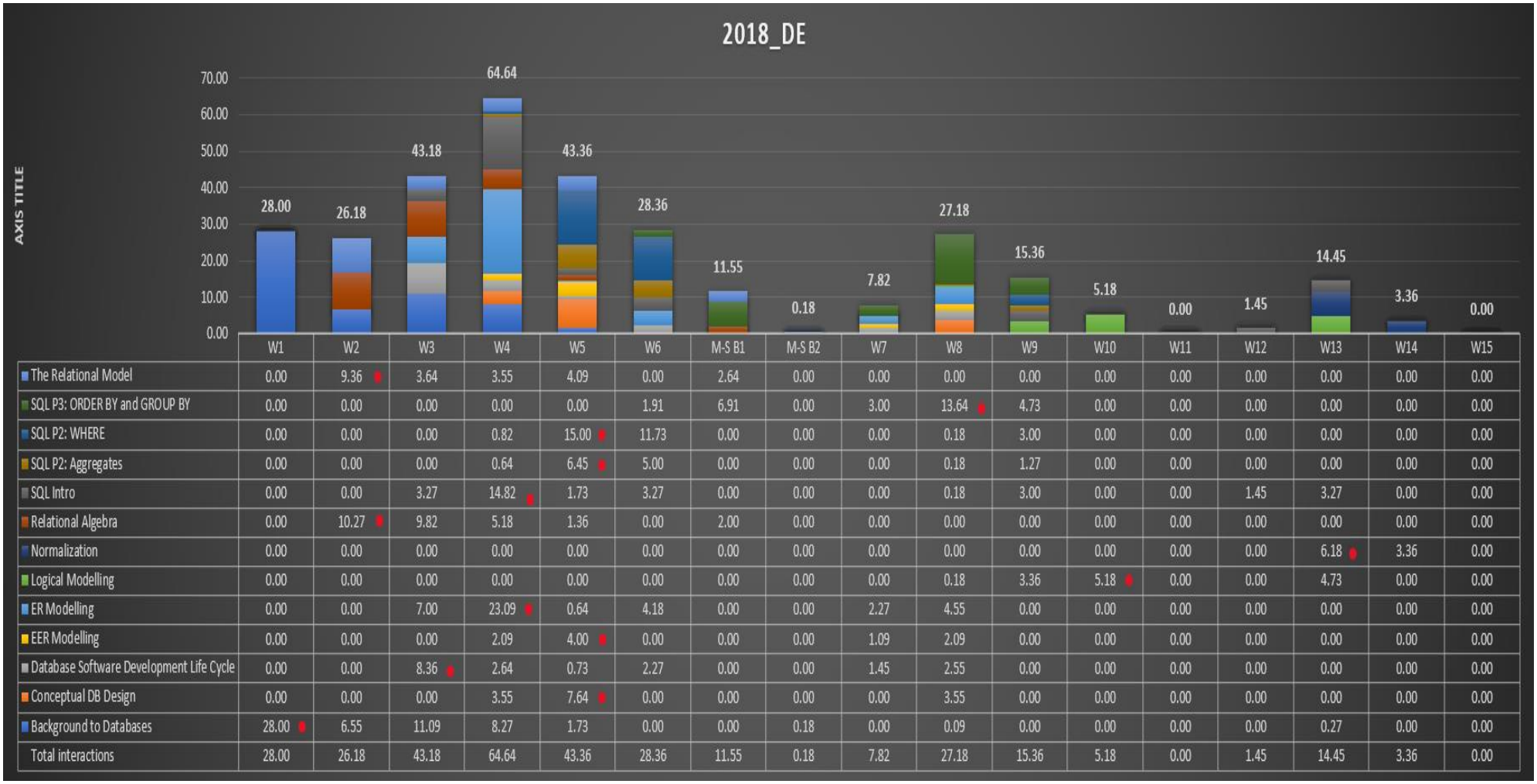
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
SQL P8: Transactions and Access Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.13	0.33	0.41	0.03	0.00
SQL P8: Integrity Enhancement Features	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.02	0.05	0.03	0.14	0.25	0.11	0.06	0.00
SQL P7: Views	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.08	0.02	0.27	0.60	0.06	0.03	0.00
SQL P7: INSERT, UPDATE, DELETE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.08	0.20	0.32	0.66	0.04	0.02	0.00
SQL P7: Create and Alter Table	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.09	0.18	0.14	0.61	0.08	0.05	0.00
SQL P6: Multi-table Joins	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.02	0.14	0.26	0.71	0.24	0.12	0.03	0.00
SQL P5: Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.22	0.52	0.80	0.35	0.06	0.10	0.00	0.00
SQL P4: Subqueries	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.05	0.19	0.48	1.05	0.09	0.06	0.10	0.12	0.00	0.00
SQL P4: Correlated Subqueries	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.01	0.16	0.31	0.78	0.20	0.13	0.03	0.03	0.00	0.00
SQL P3: ORDER BY and GROUP BY	0.00	0.00	0.00	0.00	0.00	0.31	0.01	0.09	0.21	0.84	0.00	0.05	0.05	0.14	0.20	0.01	0.01
SQL P2: WHERE	0.00	0.00	0.00	0.47	0.60	0.88	0.00	0.01	0.08	0.14	0.09	0.14	0.02	0.08	0.15	0.00	0.00
SQL P2: Aggregates	0.00	0.00	0.00	0.27	0.32	0.45	0.00	0.00	0.09	0.12	0.05	0.12	0.00	0.05	0.13	0.00	0.00
SQL Introduction	0.00	0.00	0.19	0.88	0.46	0.28	0.03	0.03	0.01	0.10	0.06	0.02	0.00	0.03	0.02	0.01	0.00
Total interactions	0.00	0.00	0.19	1.62	1.38	1.92	0.13	0.20	0.92	2.34	2.98	2.25	2.34	3.19	1.57	0.26	0.01

Figure 9.4. 16 Weekly IPS with practical course material's videos by 2019_U



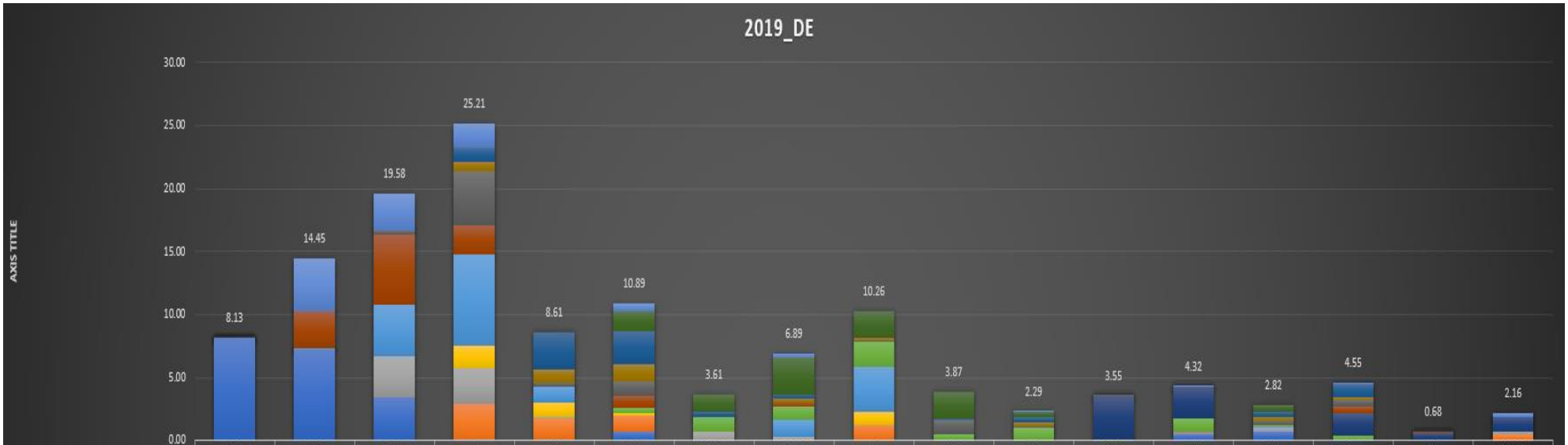
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
The Relational Model	0	7.43	5.54	5.69	1.49	0.16	0	0	0	0	0	0	0	0	0	0.55	0.29
SQL P3: ORDER BY and GROUP BY	0	0	0	0	0.22	12.94	3.91	0.27	10.43	9.38	2.31	0.51	0.02	0.22	0	0	0
SQL P2: WHERE	0	0	0	2.45	10.2	19.73	0	0	0.07	0.4	1.49	0.03	0	0.23	0.03	0	0
SQL P2: Aggregates	0	0	0	0.64	4.3	9.06	0.02	0	0.02	0.16	0.63	0	0	0.14	0	0	0
SQL Intro	0	0	1.52	13.28	13.33	3.52	0	0	0.58	0.7	0.49	0	0	0	0	0	0.05
Relational Algebra	0	9.37	7.75	6.22	1.77	1.04	0	0	0	0	0	0	0	0	0	0	0.4
Normalization	0	0	0	0	0	0	0	0	0	0	2.02	6.13	3.04	1.07	0.61	0.02	2.83
Logical Modelling	0	0	0	0	0	4.14	1.27	0.09	0.94	1.6	1.33	2.65	0	0.42	0.58	0.09	0.36
ER Modelling	0	0.73	5.23	12.47	9.99	3.58	0.01	0.28	2.39	0.89	1.74	0.68	0.35	0	0.74	0.02	0.28
EER Modelling	0	0	0	2.26	2.49	0.94	0.12	0	0.47	0	0.49	0.36	0	0	0.21	0.01	0.03
Database Software Development Life Cycle	0	0.5	4.59	3.38	2.13	1.26	0	0	1.13	0.07	0.48	0.16	0.4	0.05	0.31	0	0.31
Conceptual DB Design	0	0	0	3.99	3.88	1.82	0.38	0	0.24	0	1.11	0.61	0	0	0.41	0	0.03
Background to Databases	17.37	21.11	5.05	2.8	0.62	1.17	0.01	0	0	0.7	0	0.02	0	0	0.02	0.03	0.03
Total interactions	17.37	39.14	29.68	53.18	50.42	59.36	5.72	0.64	16.27	13.9	12.09	11.15	3.81	2.13	2.91	0.72	4.61

Figure 9.4. 17 Weekly IPS with reflection quizzes by 2018_F2F



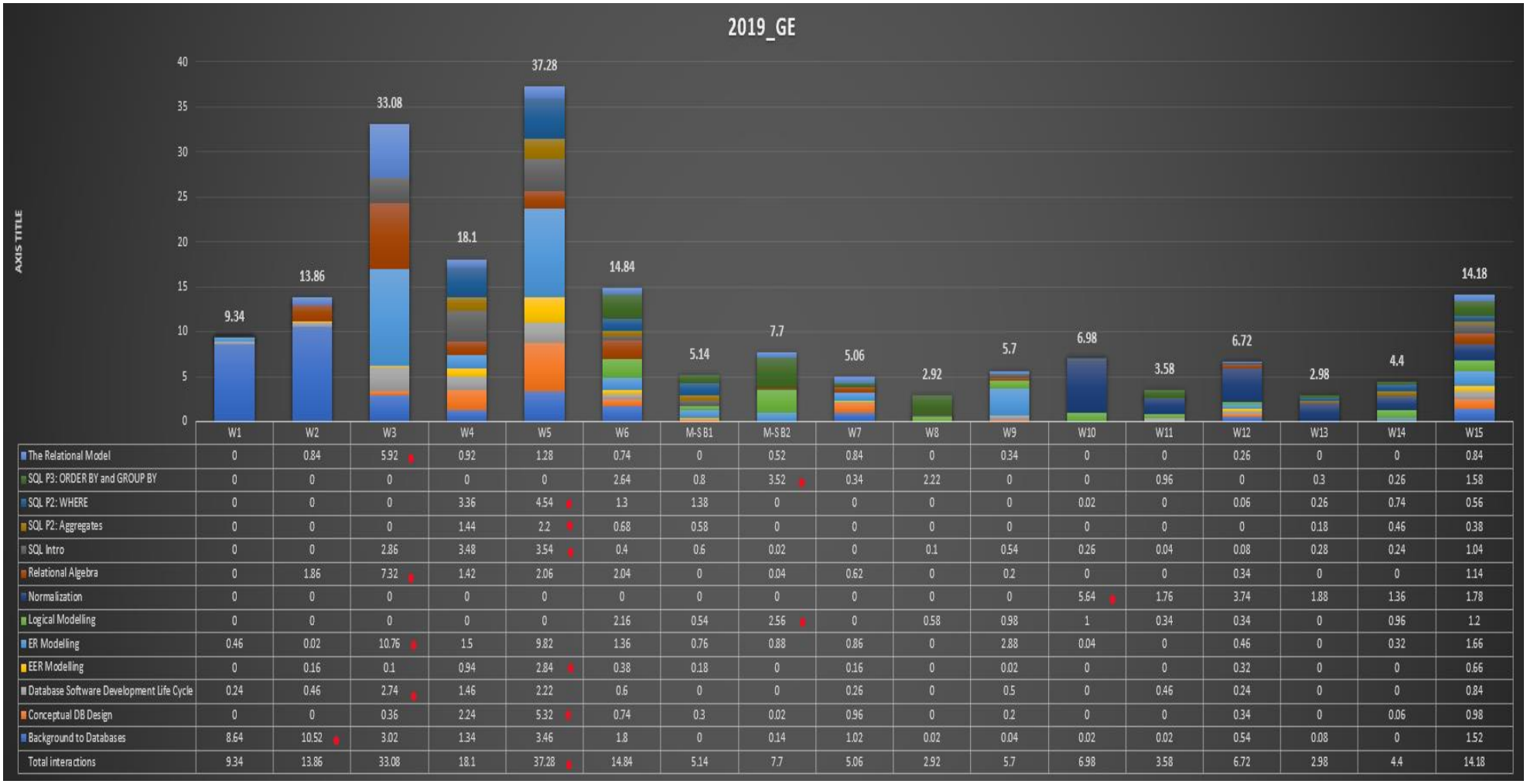
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
The Relational Model	0.00	9.36	3.64	3.55	4.09	0.00	2.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SQL P3: ORDER BY and GROUP BY	0.00	0.00	0.00	0.00	0.00	1.91	6.91	0.00	3.00	13.64	4.73	0.00	0.00	0.00	0.00	0.00	0.00
SQL P2: WHERE	0.00	0.00	0.00	0.82	15.00	11.73	0.00	0.00	0.00	0.18	3.00	0.00	0.00	0.00	0.00	0.00	0.00
SQL P2: Aggregates	0.00	0.00	0.00	0.64	6.45	5.00	0.00	0.00	0.00	0.18	1.27	0.00	0.00	0.00	0.00	0.00	0.00
SQL Intro	0.00	0.00	3.27	14.82	1.73	3.27	0.00	0.00	0.00	0.18	3.00	0.00	0.00	1.45	3.27	0.00	0.00
Relational Algebra	0.00	10.27	9.82	5.18	1.36	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Normalization	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.18	3.36	0.00
Logical Modelling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	3.36	5.18	0.00	0.00	4.73	0.00	0.00
ER Modelling	0.00	0.00	7.00	23.09	0.64	4.18	0.00	0.00	2.27	4.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EER Modelling	0.00	0.00	0.00	2.09	4.00	0.00	0.00	0.00	1.09	2.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Database Software Development Life Cycle	0.00	0.00	8.36	2.64	0.73	2.27	0.00	0.00	1.45	2.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Conceptual DB Design	0.00	0.00	0.00	3.55	7.64	0.00	0.00	0.00	0.00	3.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Background to Databases	28.00	6.55	11.09	8.27	1.73	0.00	0.00	0.18	0.00	0.09	0.00	0.00	0.00	0.00	0.27	0.00	0.00
Total interactions	28.00	26.18	43.18	64.64	43.36	28.36	11.55	0.18	7.82	27.18	15.36	5.18	0.00	1.45	14.45	3.36	0.00

Figure 9.4. 18 Weekly IPS with reflection quizzes by 2018_DE



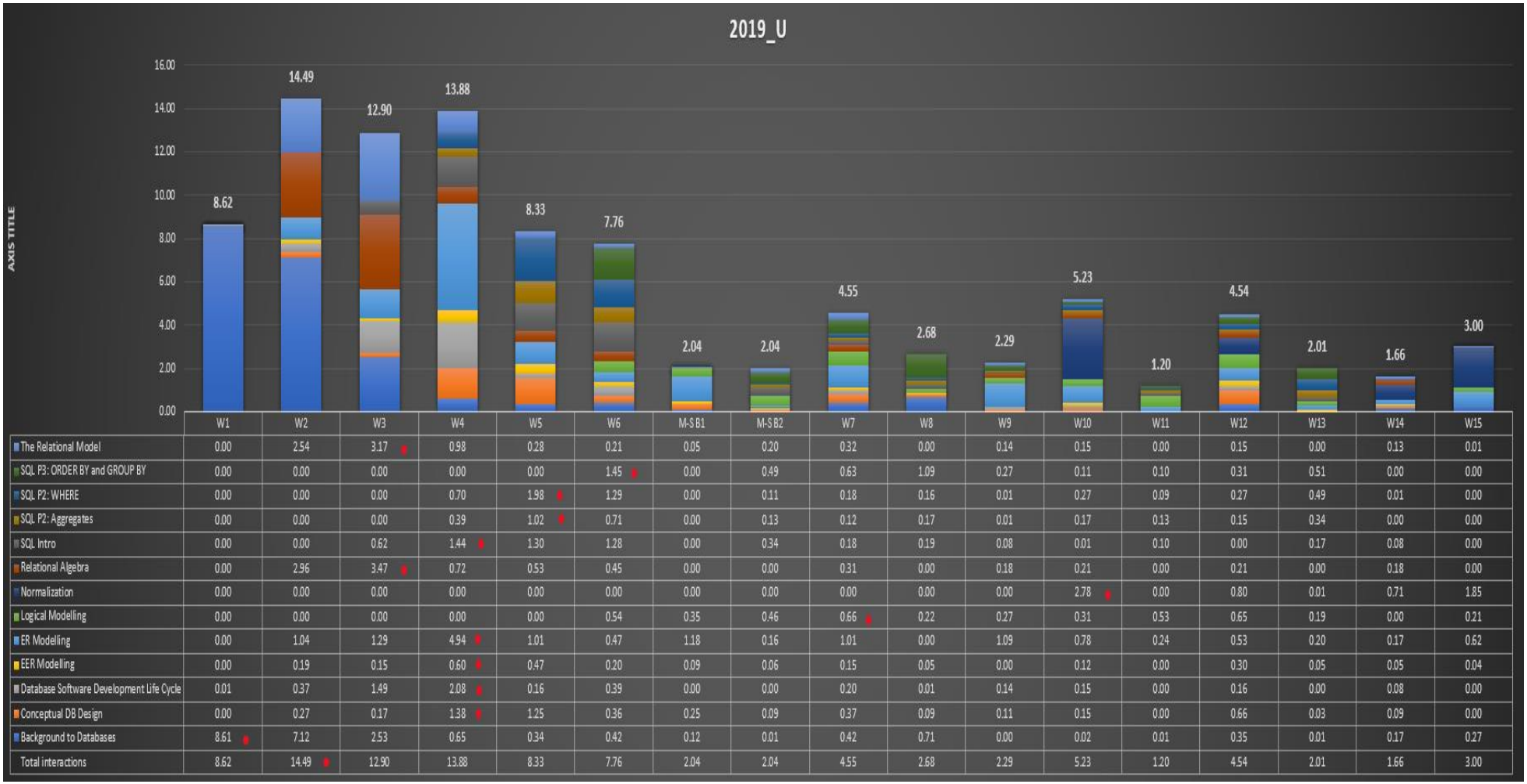
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
The Relational Model	0.00	4.21	2.89	1.95	0.00	0.63	0.00	0.29	0.00	0.00	0.03	0.00	0.03	0.00	0.05	0.00	0.29
SQL P3: ORDER BY and GROUP BY	0.00	0.00	0.00	0.00	0.00	1.55	1.34	2.92	2.08	2.16	0.45	0.00	0.00	0.50	0.00	0.00	0.00
SQL P2: WHERE	0.00	0.00	0.00	1.11	2.92	2.68	0.37	0.39	0.00	0.05	0.39	0.00	0.03	0.42	1.05	0.00	0.00
SQL P2: Aggregates	0.00	0.00	0.00	0.74	1.05	1.34	0.03	0.24	0.26	0.03	0.34	0.00	0.00	0.32	0.21	0.00	0.00
SQL Intro	0.00	0.00	0.34	4.37	0.39	1.11	0.00	0.00	0.03	1.13	0.03	0.03	0.00	0.37	0.55	0.00	0.00
Relational Algebra	0.00	2.95	5.61	2.32	0.00	0.97	0.00	0.39	0.00	0.00	0.03	0.00	0.03	0.00	0.47	0.11	0.00
Normalization	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.42	2.50	0.00	1.84	0.58	1.16
Logical Modelling	0.00	0.00	0.00	0.00	0.00	0.42	1.21	0.97	2.00	0.47	1.03	0.11	1.03	0.08	0.29	0.00	0.00
ER Modelling	0.00	0.03	4.08	7.21	1.18	0.00	0.00	1.37	3.66	0.03	0.00	0.00	0.08	0.08	0.00	0.00	0.00
EER Modelling	0.00	0.00	0.00	1.74	1.24	0.24	0.00	0.00	0.97	0.00	0.00	0.00	0.03	0.00	0.05	0.00	0.00
Database Software Development Life Cycle	0.00	0.00	3.26	2.92	0.03	0.00	0.66	0.32	0.00	0.00	0.00	0.00	0.03	0.32	0.00	0.00	0.26
Conceptual DB Design	0.00	0.00	0.00	2.82	1.74	1.21	0.00	0.00	1.26	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.45
Background to Databases	8.13	7.26	3.39	0.05	0.05	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.74	0.03	0.00	0.00
Total interactions	8.13	14.45	19.58	25.21	8.61	10.89	3.61	6.89	10.26	3.87	2.29	3.55	4.32	2.82	4.55	0.68	2.16

Figure 9.4. 19 Weekly IPS with reflection quizzes by 2019_DE



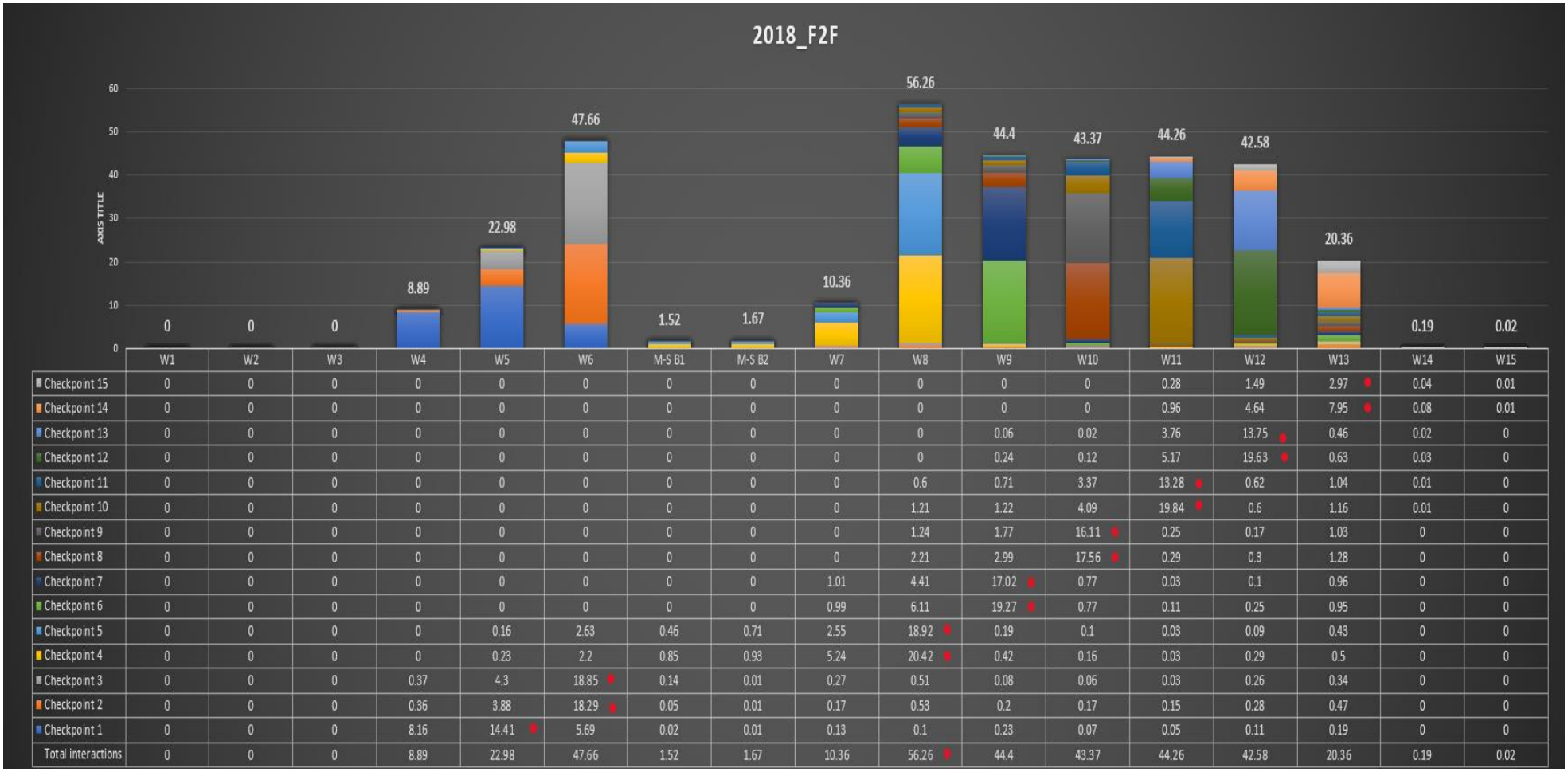
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
The Relational Model	0	0.84	5.92	0.92	1.28	0.74	0	0.52	0.84	0	0.34	0	0	0.26	0	0	0.84
SQL P3: ORDER BY and GROUP BY	0	0	0	0	0	2.64	0.8	3.52	0.34	2.22	0	0	0.96	0	0.3	0.26	1.58
SQL P2: WHERE	0	0	0	3.36	4.54	1.3	1.38	0	0	0	0	0.02	0	0.06	0.26	0.74	0.56
SQL P2: Aggregates	0	0	0	1.44	2.2	0.68	0.58	0	0	0	0	0	0	0	0.18	0.46	0.38
SQL Intro	0	0	2.86	3.48	3.54	0.4	0.6	0.02	0	0.1	0.54	0.26	0.04	0.08	0.28	0.24	1.04
Relational Algebra	0	1.86	7.32	1.42	2.06	2.04	0	0.04	0.62	0	0.2	0	0	0.34	0	0	1.14
Normalization	0	0	0	0	0	0	0	0	0	0	0	5.64	1.76	3.74	1.88	1.36	1.78
Logical Modelling	0	0	0	0	0	2.16	0.54	2.56	0	0.58	0.98	1	0.34	0.34	0	0.96	1.2
ER Modelling	0.46	0.02	10.76	1.5	9.82	1.36	0.76	0.88	0.86	0	2.88	0.04	0	0.46	0	0.32	1.66
EER Modelling	0	0.16	0.1	0.94	2.84	0.38	0.18	0	0.16	0	0.02	0	0	0.32	0	0	0.66
Database Software Development Life Cycle	0.24	0.46	2.74	1.46	2.22	0.6	0	0	0.26	0	0.5	0	0.46	0.24	0	0	0.84
Conceptual DB Design	0	0	0.36	2.24	5.32	0.74	0.3	0.02	0.96	0	0.2	0	0	0.34	0	0.06	0.98
Background to Databases	8.64	10.52	3.02	1.34	3.46	1.8	0	0.14	1.02	0.02	0.04	0.02	0.02	0.54	0.08	0	1.52
Total interactions	9.34	13.86	33.08	18.1	37.28	14.84	5.14	7.7	5.06	2.92	5.7	6.98	3.58	6.72	2.98	4.4	14.18

Figure 9.4. 20 Weekly IPS with reflection quizzes by 2019_GE



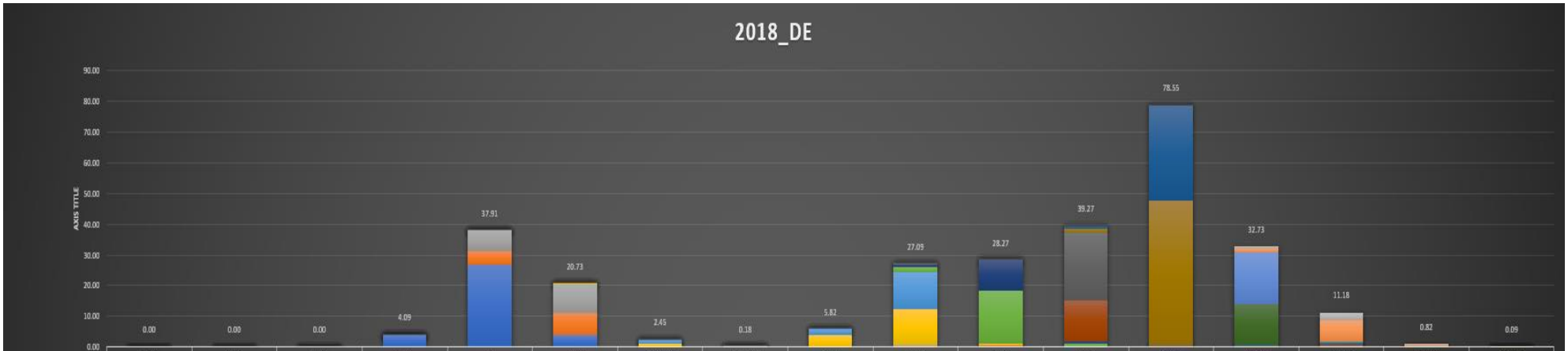
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
The Relational Model	0.00	2.54	3.17	0.98	0.28	0.21	0.05	0.20	0.32	0.00	0.14	0.15	0.00	0.15	0.00	0.13	0.01
SQL P3: ORDER BY and GROUP BY	0.00	0.00	0.00	0.00	0.00	1.45	0.00	0.49	0.63	1.09	0.27	0.11	0.10	0.31	0.51	0.00	0.00
SQL P2: WHERE	0.00	0.00	0.00	0.70	1.98	1.29	0.00	0.11	0.18	0.16	0.01	0.27	0.09	0.27	0.49	0.01	0.00
SQL P2: Aggregates	0.00	0.00	0.00	0.39	1.02	0.71	0.00	0.13	0.12	0.17	0.01	0.17	0.13	0.15	0.34	0.00	0.00
SQL Intro	0.00	0.00	0.62	1.44	1.30	1.28	0.00	0.34	0.18	0.19	0.08	0.01	0.10	0.00	0.17	0.08	0.00
Relational Algebra	0.00	2.96	3.47	0.72	0.53	0.45	0.00	0.00	0.31	0.00	0.18	0.21	0.00	0.21	0.00	0.18	0.00
Normalization	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.78	0.00	0.80	0.01	0.71	1.85
Logical Modelling	0.00	0.00	0.00	0.00	0.00	0.54	0.35	0.46	0.66	0.22	0.27	0.31	0.53	0.65	0.19	0.00	0.21
ER Modelling	0.00	1.04	1.29	4.94	1.01	0.47	1.18	0.16	1.01	0.00	1.09	0.78	0.24	0.53	0.20	0.17	0.62
EER Modelling	0.00	0.19	0.15	0.60	0.47	0.20	0.09	0.06	0.15	0.05	0.00	0.12	0.00	0.30	0.05	0.05	0.04
Database Software Development Life Cycle	0.01	0.37	1.49	2.08	0.16	0.39	0.00	0.00	0.20	0.01	0.14	0.15	0.00	0.16	0.00	0.08	0.00
Conceptual DB Design	0.00	0.27	0.17	1.38	1.25	0.36	0.25	0.09	0.37	0.09	0.11	0.15	0.00	0.66	0.03	0.09	0.00
Background to Databases	8.61	7.12	2.53	0.65	0.34	0.42	0.12	0.01	0.42	0.71	0.00	0.02	0.01	0.35	0.01	0.17	0.27
Total interactions	8.62	14.49	12.90	13.88	8.33	7.76	2.04	2.04	4.55	2.68	2.29	5.23	1.20	4.54	2.01	1.66	3.00

Figure 9.4. 21 Weekly IPS with reflection quizzes by 2019_U



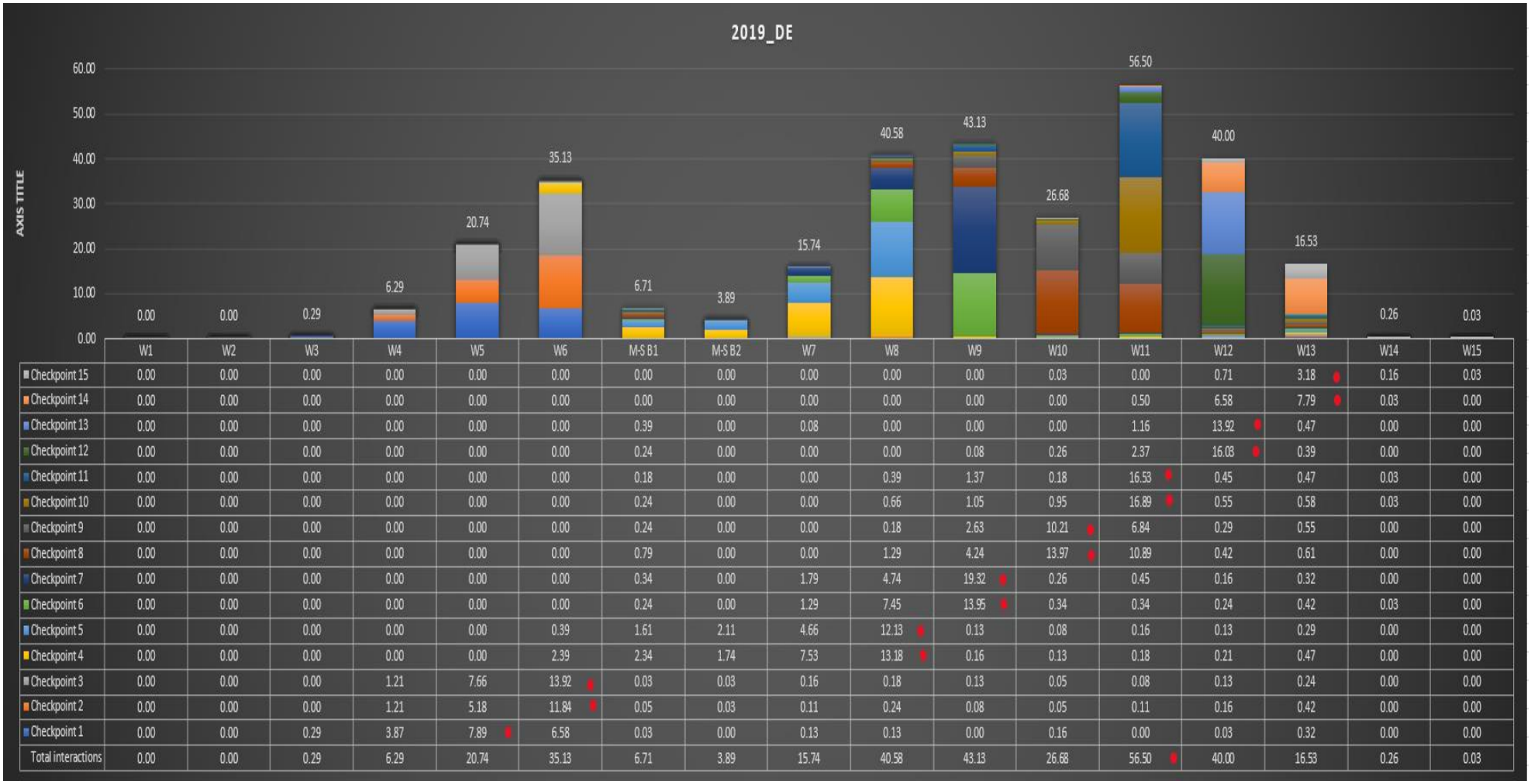
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Checkpoint 15	0	0	0	0	0	0	0	0	0	0	0	0	0.28	1.49	2.97	0.04	0.01
Checkpoint 14	0	0	0	0	0	0	0	0	0	0	0	0	0.96	4.64	7.95	0.08	0.01
Checkpoint 13	0	0	0	0	0	0	0	0	0	0	0.06	0.02	3.76	13.75	0.46	0.02	0
Checkpoint 12	0	0	0	0	0	0	0	0	0	0	0.24	0.12	5.17	19.63	0.63	0.03	0
Checkpoint 11	0	0	0	0	0	0	0	0	0	0.6	0.71	3.37	13.28	0.62	1.04	0.01	0
Checkpoint 10	0	0	0	0	0	0	0	0	0	1.21	1.22	4.09	19.84	0.6	1.16	0.01	0
Checkpoint 9	0	0	0	0	0	0	0	0	0	1.24	1.77	16.11	0.25	0.17	1.03	0	0
Checkpoint 8	0	0	0	0	0	0	0	0	0	2.21	2.99	17.56	0.29	0.3	1.28	0	0
Checkpoint 7	0	0	0	0	0	0	0	0	1.01	4.41	17.02	0.77	0.03	0.1	0.96	0	0
Checkpoint 6	0	0	0	0	0	0	0	0	0.99	6.11	19.27	0.77	0.11	0.25	0.95	0	0
Checkpoint 5	0	0	0	0	0.16	2.63	0.46	0.71	2.55	18.92	0.19	0.1	0.03	0.09	0.43	0	0
Checkpoint 4	0	0	0	0	0.23	2.2	0.85	0.93	5.24	20.42	0.42	0.16	0.03	0.29	0.5	0	0
Checkpoint 3	0	0	0	0.37	4.3	18.85	0.14	0.01	0.27	0.51	0.08	0.06	0.03	0.26	0.34	0	0
Checkpoint 2	0	0	0	0.36	3.88	18.29	0.05	0.01	0.17	0.53	0.2	0.17	0.15	0.28	0.47	0	0
Checkpoint 1	0	0	0	8.16	14.41	5.69	0.02	0.01	0.13	0.1	0.23	0.07	0.05	0.11	0.19	0	0
Total interactions	0	0	0	8.89	22.98	47.66	1.52	1.67	10.36	56.26	44.4	43.37	44.26	42.58	20.36	0.19	0.02

Figure 9.4. 22 Weekly IPS with practical quizzes (checkpoints) by 2018_F2F



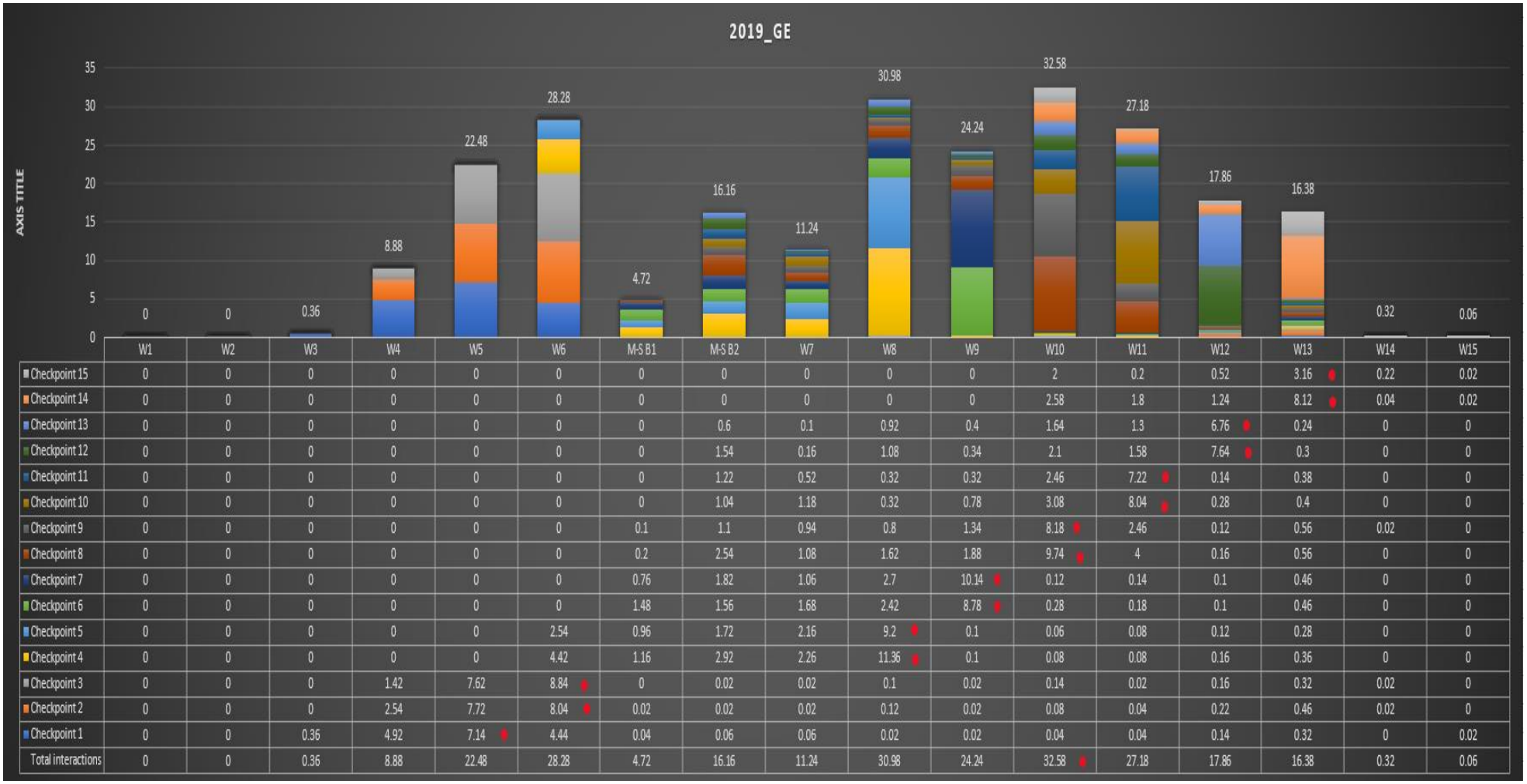
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Checkpoint 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	2.45	0.27	0.00
Checkpoint 14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.18	6.64	0.18	0.00
Checkpoint 13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16.82	0.45	0.18	0.00
Checkpoint 12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.36	0.45	0.18	0.00
Checkpoint 11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91	31.00	0.36	0.36	0.00	0.00
Checkpoint 10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.27	47.00	0.36	0.09	0.00	0.00
Checkpoint 9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	22.09	0.27	0.00	0.18	0.00	0.00
Checkpoint 8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.27	0.27	0.00	0.18	0.00	0.00
Checkpoint 7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91	9.91	0.64	0.00	0.00	0.18	0.00	0.00
Checkpoint 6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.45	17.18	0.91	0.00	0.00	0.00	0.00	0.09
Checkpoint 5	0.00	0.00	0.00	0.00	0.00	0.00	1.18	0.00	2.00	12.18	0.18	0.09	0.00	0.00	0.00	0.00	0.00
Checkpoint 4	0.00	0.00	0.00	0.00	0.00	0.45	1.18	0.00	3.82	11.55	0.27	0.09	0.00	0.00	0.00	0.00	0.00
Checkpoint 3	0.00	0.00	0.00	0.00	6.73	9.18	0.00	0.09	0.00	0.27	0.18	0.00	0.00	0.00	0.00	0.00	0.00
Checkpoint 2	0.00	0.00	0.00	0.00	4.55	7.00	0.09	0.00	0.00	0.45	0.18	0.00	0.00	0.00	0.18	0.00	0.00
Checkpoint 1	0.00	0.00	0.00	4.09	26.64	4.09	0.00	0.09	0.00	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00
Total interactions	0.00	0.00	0.00	4.09	37.91	20.73	2.45	0.18	5.82	27.09	28.27	39.27	78.55	32.73	11.18	0.82	0.09

Figure 9.4. 23 Weekly IPS with practical quizzes (checkpoints) by 2018_DE



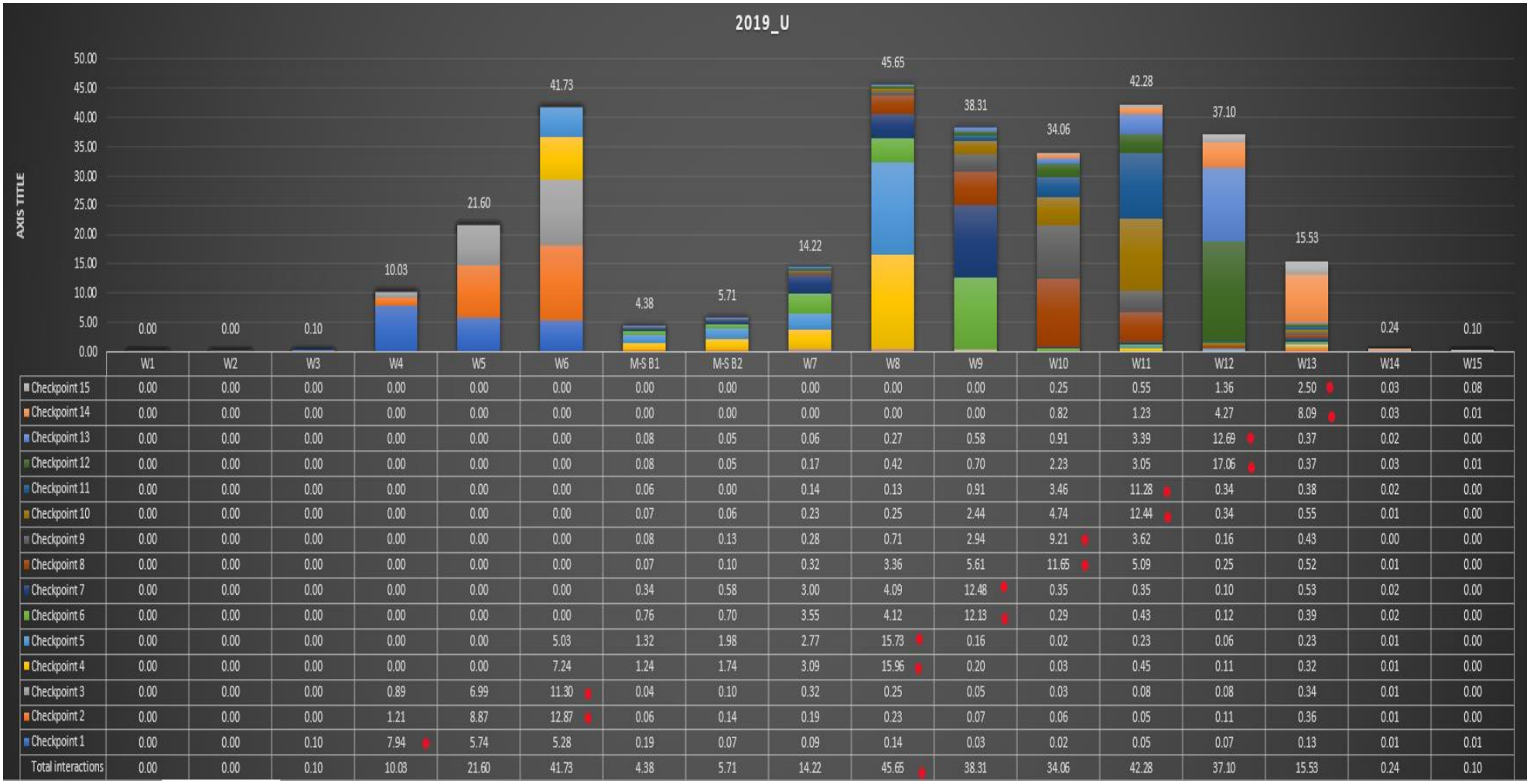
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Checkpoint 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.71	3.18	0.16	0.03
Checkpoint 14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	6.58	7.79	0.03	0.00
Checkpoint 13	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.00	0.08	0.00	0.00	0.00	1.16	13.92	0.47	0.00	0.00
Checkpoint 12	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.00	0.08	0.26	2.37	16.03	0.39	0.00	0.00
Checkpoint 11	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.39	1.37	0.18	16.53	0.45	0.47	0.03	0.00
Checkpoint 10	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.66	1.05	0.95	16.89	0.55	0.58	0.03	0.00
Checkpoint 9	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.00	0.18	2.63	10.21	6.84	0.29	0.55	0.00	0.00
Checkpoint 8	0.00	0.00	0.00	0.00	0.00	0.00	0.79	0.00	0.00	1.29	4.24	13.97	10.89	0.42	0.61	0.00	0.00
Checkpoint 7	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.00	1.79	4.74	19.32	0.26	0.45	0.16	0.32	0.00	0.00
Checkpoint 6	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	1.29	7.45	13.95	0.34	0.34	0.24	0.42	0.03	0.00
Checkpoint 5	0.00	0.00	0.00	0.00	0.00	0.39	1.61	2.11	4.66	12.13	0.13	0.08	0.16	0.13	0.29	0.00	0.00
Checkpoint 4	0.00	0.00	0.00	0.00	0.00	2.39	2.34	1.74	7.53	13.18	0.16	0.13	0.18	0.21	0.47	0.00	0.00
Checkpoint 3	0.00	0.00	0.00	1.21	7.66	13.92	0.03	0.03	0.16	0.18	0.13	0.05	0.08	0.13	0.24	0.00	0.00
Checkpoint 2	0.00	0.00	0.00	1.21	5.18	11.84	0.05	0.03	0.11	0.24	0.08	0.05	0.11	0.16	0.42	0.00	0.00
Checkpoint 1	0.00	0.00	0.29	3.87	7.89	6.58	0.03	0.00	0.13	0.13	0.00	0.16	0.00	0.03	0.32	0.00	0.00
Total interactions	0.00	0.00	0.29	6.29	20.74	35.13	6.71	3.89	15.74	40.58	43.13	26.68	56.50	40.00	16.53	0.26	0.03

Figure 9.4. 24 Weekly IPS with practical quizzes (checkpoints) by 2019_DE



	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Checkpoint 15	0	0	0	0	0	0	0	0	0	0	0	2	0.2	0.52	3.16	0.22	0.02
Checkpoint 14	0	0	0	0	0	0	0	0	0	0	0	2.58	1.8	1.24	8.12	0.04	0.02
Checkpoint 13	0	0	0	0	0	0	0	0.6	0.1	0.92	0.4	1.64	1.3	6.76	0.24	0	0
Checkpoint 12	0	0	0	0	0	0	0	1.54	0.16	1.08	0.34	2.1	1.58	7.64	0.3	0	0
Checkpoint 11	0	0	0	0	0	0	0	1.22	0.52	0.32	0.32	2.46	7.22	0.14	0.38	0	0
Checkpoint 10	0	0	0	0	0	0	0	1.04	1.18	0.32	0.78	3.08	8.04	0.28	0.4	0	0
Checkpoint 9	0	0	0	0	0	0	0.1	1.1	0.94	0.8	1.34	8.18	2.46	0.12	0.56	0.02	0
Checkpoint 8	0	0	0	0	0	0	0.2	2.54	1.08	1.62	1.88	9.74	4	0.16	0.56	0	0
Checkpoint 7	0	0	0	0	0	0	0.76	1.82	1.06	2.7	10.14	0.12	0.14	0.1	0.46	0	0
Checkpoint 6	0	0	0	0	0	0	1.48	1.56	1.68	2.42	8.78	0.28	0.18	0.1	0.46	0	0
Checkpoint 5	0	0	0	0	0	2.54	0.96	1.72	2.16	9.2	0.1	0.06	0.08	0.12	0.28	0	0
Checkpoint 4	0	0	0	0	0	4.42	1.16	2.92	2.26	11.36	0.1	0.08	0.08	0.16	0.36	0	0
Checkpoint 3	0	0	0	1.42	7.62	8.84	0	0.02	0.02	0.1	0.02	0.14	0.02	0.16	0.32	0.02	0
Checkpoint 2	0	0	0	2.54	7.72	8.04	0.02	0.02	0.02	0.12	0.02	0.08	0.04	0.22	0.46	0.02	0
Checkpoint 1	0	0	0.36	4.92	7.14	4.44	0.04	0.06	0.06	0.02	0.02	0.04	0.04	0.14	0.32	0	0.02
Total interactions	0	0	0.36	8.88	22.48	28.28	4.72	16.16	11.24	30.98	24.24	32.58	27.18	17.86	16.38	0.32	0.06

Figure 9.4. 25 Weekly IPS with practical quizzes (checkpoints) by 2019_GE



	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Checkpoint 15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.55	1.36	2.50	0.03	0.08
Checkpoint 14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82	1.23	4.27	8.09	0.03	0.01
Checkpoint 13	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.05	0.06	0.27	0.58	0.91	3.39	12.69	0.37	0.02	0.00
Checkpoint 12	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.05	0.17	0.42	0.70	2.23	3.05	17.06	0.37	0.03	0.01
Checkpoint 11	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.14	0.13	0.91	3.46	11.28	0.34	0.38	0.02	0.00
Checkpoint 10	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.06	0.23	0.25	2.44	4.74	12.44	0.34	0.55	0.01	0.00
Checkpoint 9	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.13	0.28	0.71	2.94	9.21	3.62	0.16	0.43	0.00	0.00
Checkpoint 8	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.10	0.32	3.36	5.61	11.65	5.09	0.25	0.52	0.01	0.00
Checkpoint 7	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.58	3.00	4.09	12.48	0.35	0.35	0.10	0.53	0.02	0.00
Checkpoint 6	0.00	0.00	0.00	0.00	0.00	0.00	0.76	0.70	3.55	4.12	12.13	0.29	0.43	0.12	0.39	0.02	0.00
Checkpoint 5	0.00	0.00	0.00	0.00	0.00	5.03	1.32	1.98	2.77	15.73	0.16	0.02	0.23	0.06	0.23	0.01	0.00
Checkpoint 4	0.00	0.00	0.00	0.00	0.00	7.24	1.24	1.74	3.09	15.96	0.20	0.03	0.45	0.11	0.32	0.01	0.00
Checkpoint 3	0.00	0.00	0.00	0.89	6.99	11.30	0.04	0.10	0.32	0.25	0.05	0.03	0.08	0.08	0.34	0.01	0.00
Checkpoint 2	0.00	0.00	0.00	1.21	8.87	12.87	0.06	0.14	0.19	0.23	0.07	0.06	0.05	0.11	0.36	0.01	0.00
Checkpoint 1	0.00	0.00	0.10	7.94	5.74	5.28	0.19	0.07	0.09	0.14	0.03	0.02	0.05	0.07	0.13	0.01	0.01
Total interactions	0.00	0.00	0.10	10.03	21.60	41.73	4.38	5.71	14.22	45.65	38.31	34.06	42.28	37.10	15.53	0.24	0.10

Figure 9.4. 26 Weekly IPS with practical quizzes (checkpoints) by 2019_U

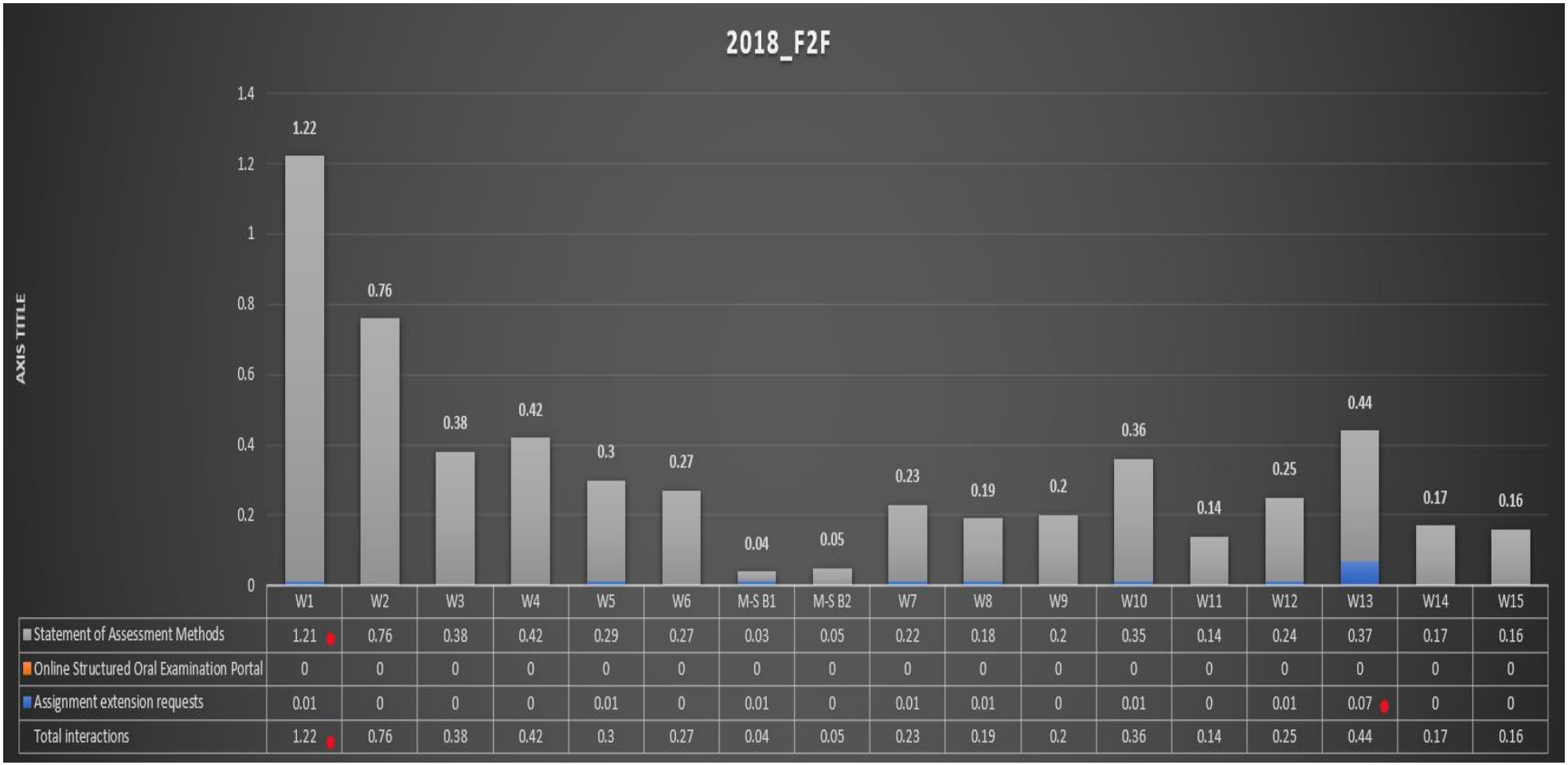
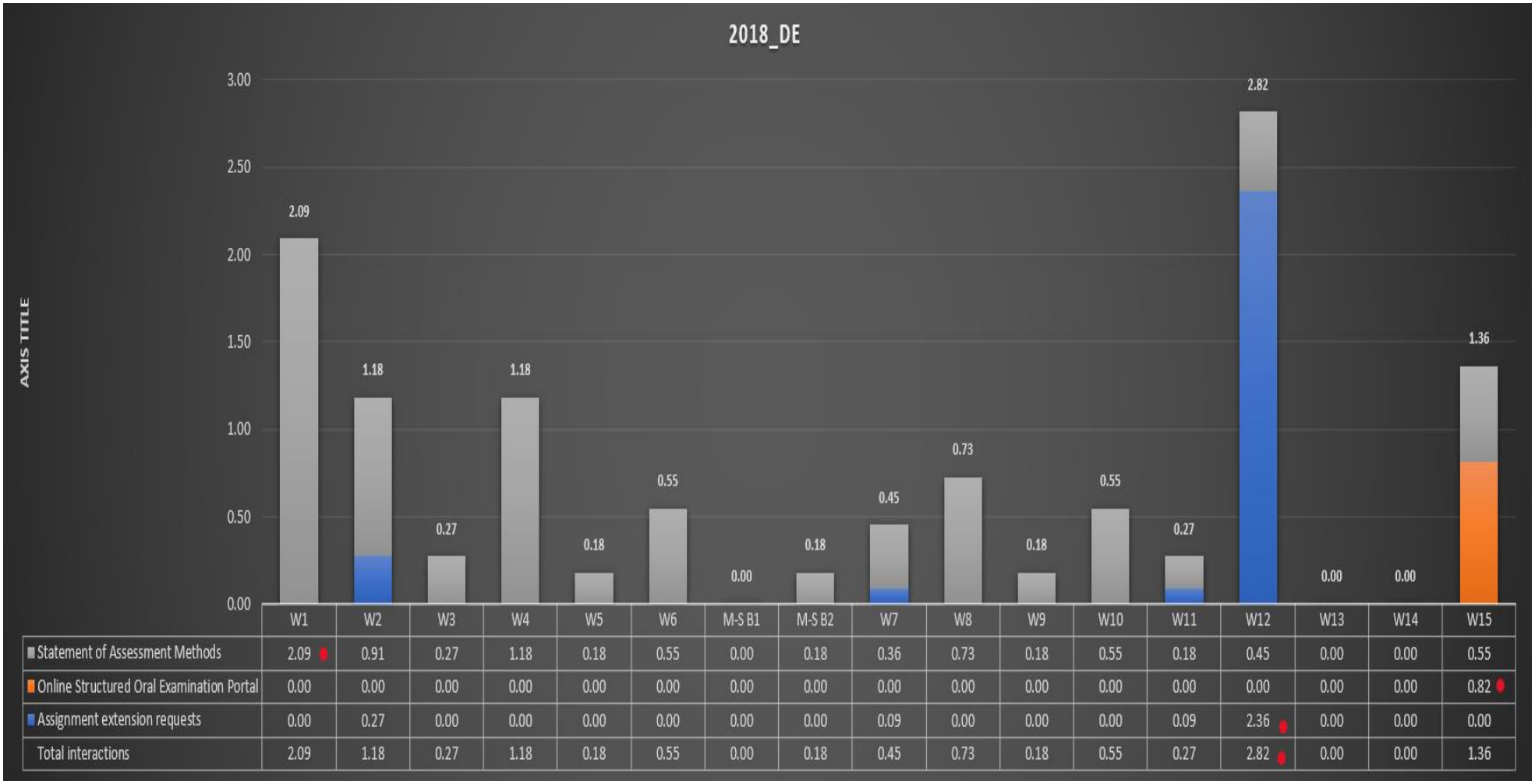
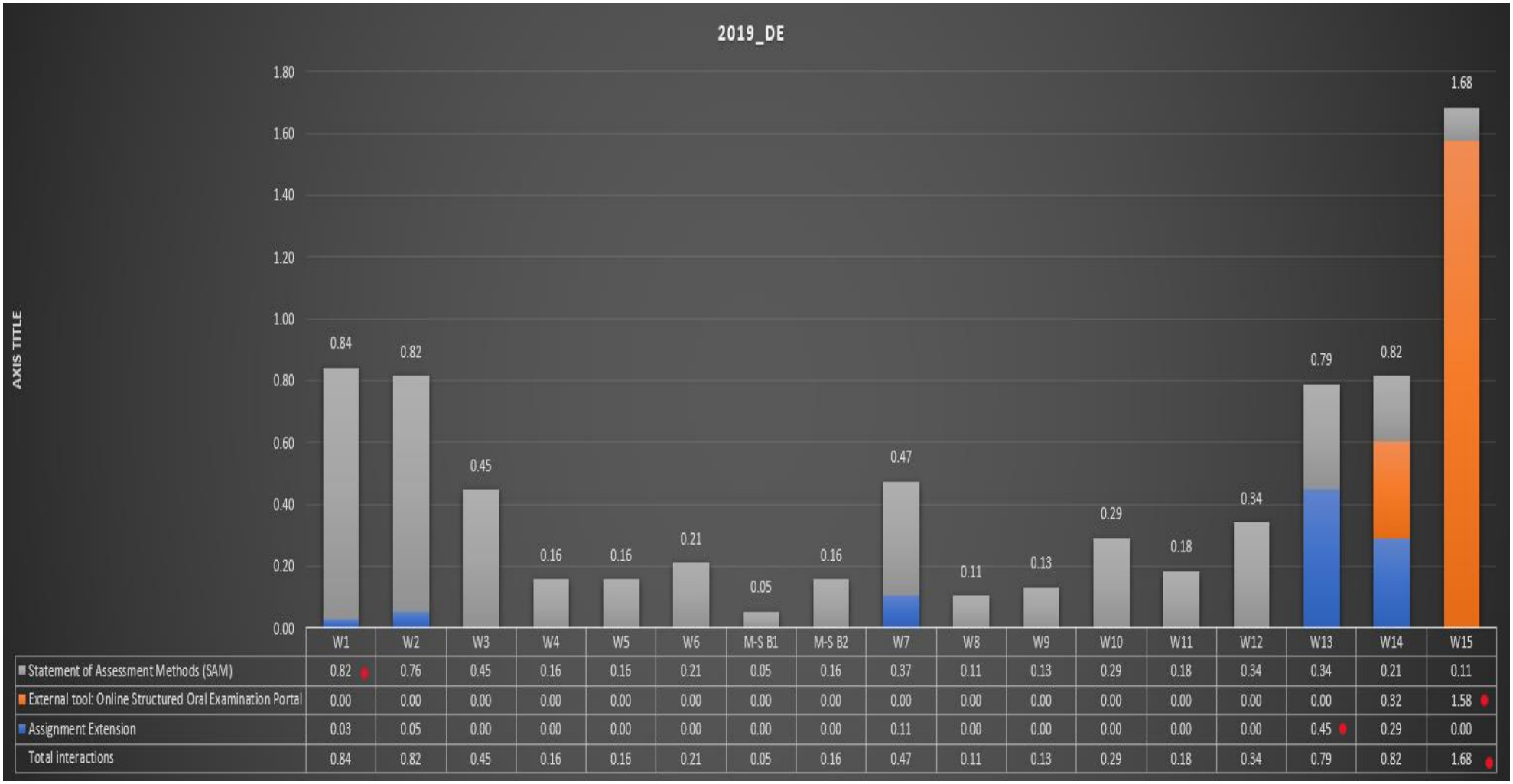


Figure 9.4. 27 Weekly IPS with external tools by 2018_F2F



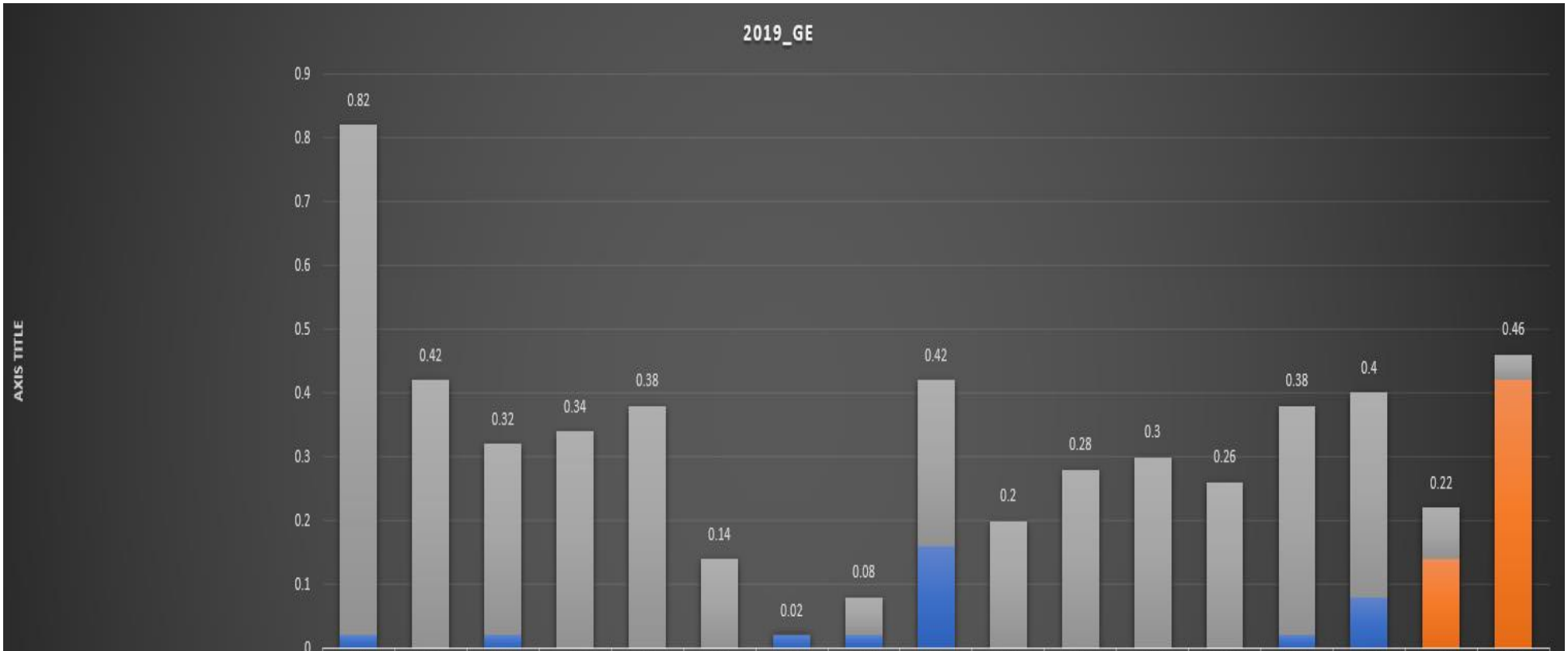
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Statement of Assessment Methods	2.09	0.91	0.27	1.18	0.18	0.55	0.00	0.18	0.36	0.73	0.18	0.55	0.18	0.45	0.00	0.00	0.55
Online Structured Oral Examination Portal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82
Assignment extension requests	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.09	2.36	0.00	0.00	0.00
Total interactions	2.09	1.18	0.27	1.18	0.18	0.55	0.00	0.18	0.45	0.73	0.18	0.55	0.27	2.82	0.00	0.00	1.36

Figure 9.4. 28 Weekly IPS with external tools by 2018_DE



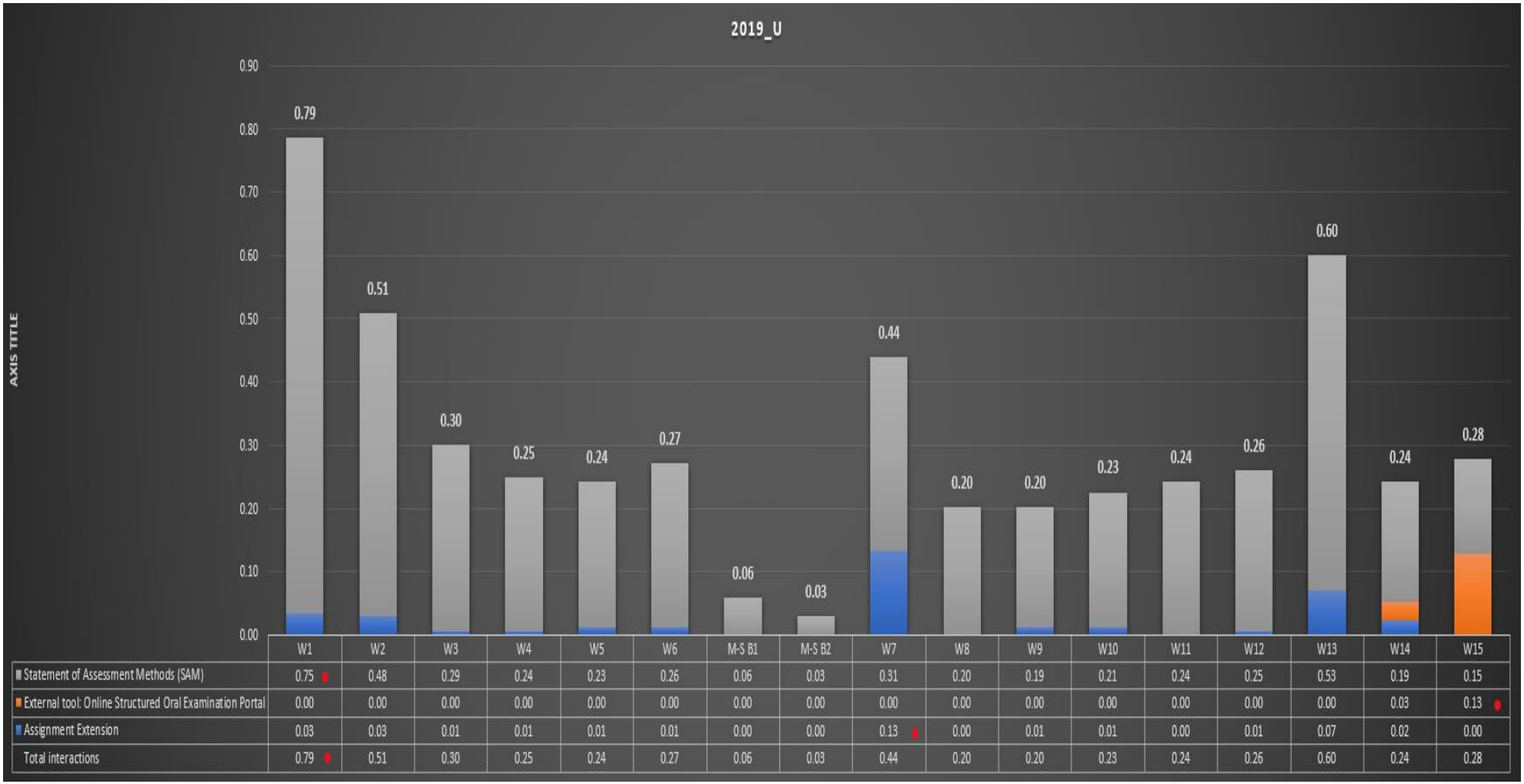
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Statement of Assessment Methods (SAM)	0.82	0.76	0.45	0.16	0.16	0.21	0.05	0.16	0.37	0.11	0.13	0.29	0.18	0.34	0.34	0.21	0.11
External tool: Online Structured Oral Examination Portal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	1.58
Assignment Extension	0.03	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.45	0.29	0.00
Total interactions	0.84	0.82	0.45	0.16	0.16	0.21	0.05	0.16	0.47	0.11	0.13	0.29	0.18	0.34	0.79	0.82	1.68

Figure 9.4. 29 Weekly IPS with external tools by 2019_DE



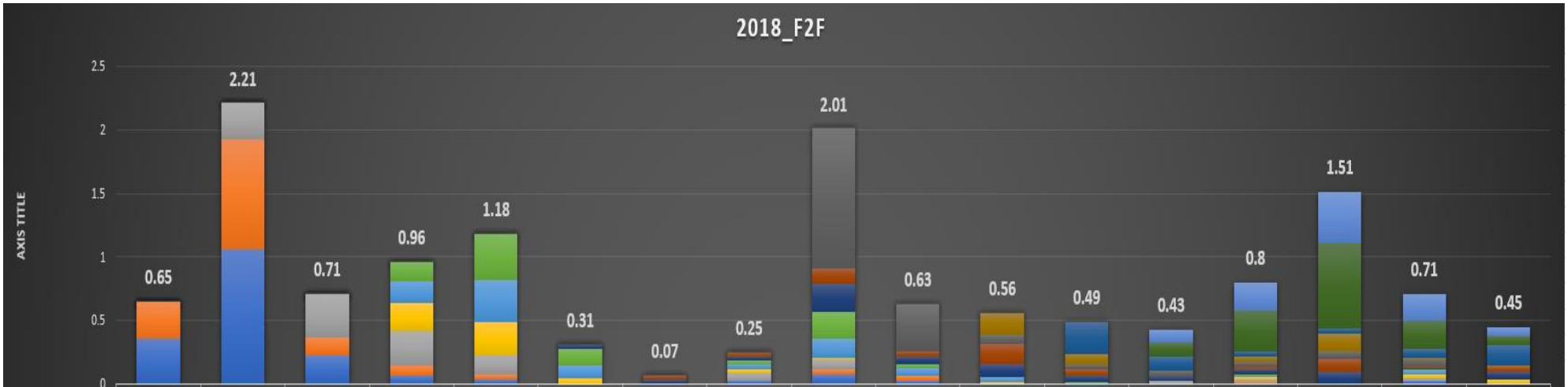
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Statement of Assessment Methods (SAM)	0.8	0.42	0.3	0.34	0.38	0.14	0	0.06	0.26	0.2	0.28	0.3	0.26	0.36	0.32	0.08	0.04
External tool: Online Structured Oral Examination Portal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.14	0.42
Assignment Extension	0.02	0	0.02	0	0	0	0.02	0.02	0.16	0	0	0	0	0.02	0.08	0	0
Total interactions	0.82	0.42	0.32	0.34	0.38	0.14	0.02	0.08	0.42	0.2	0.28	0.3	0.26	0.38	0.4	0.22	0.46

Figure 9.4. 30 Weekly IPS with external tools by 2019_GE



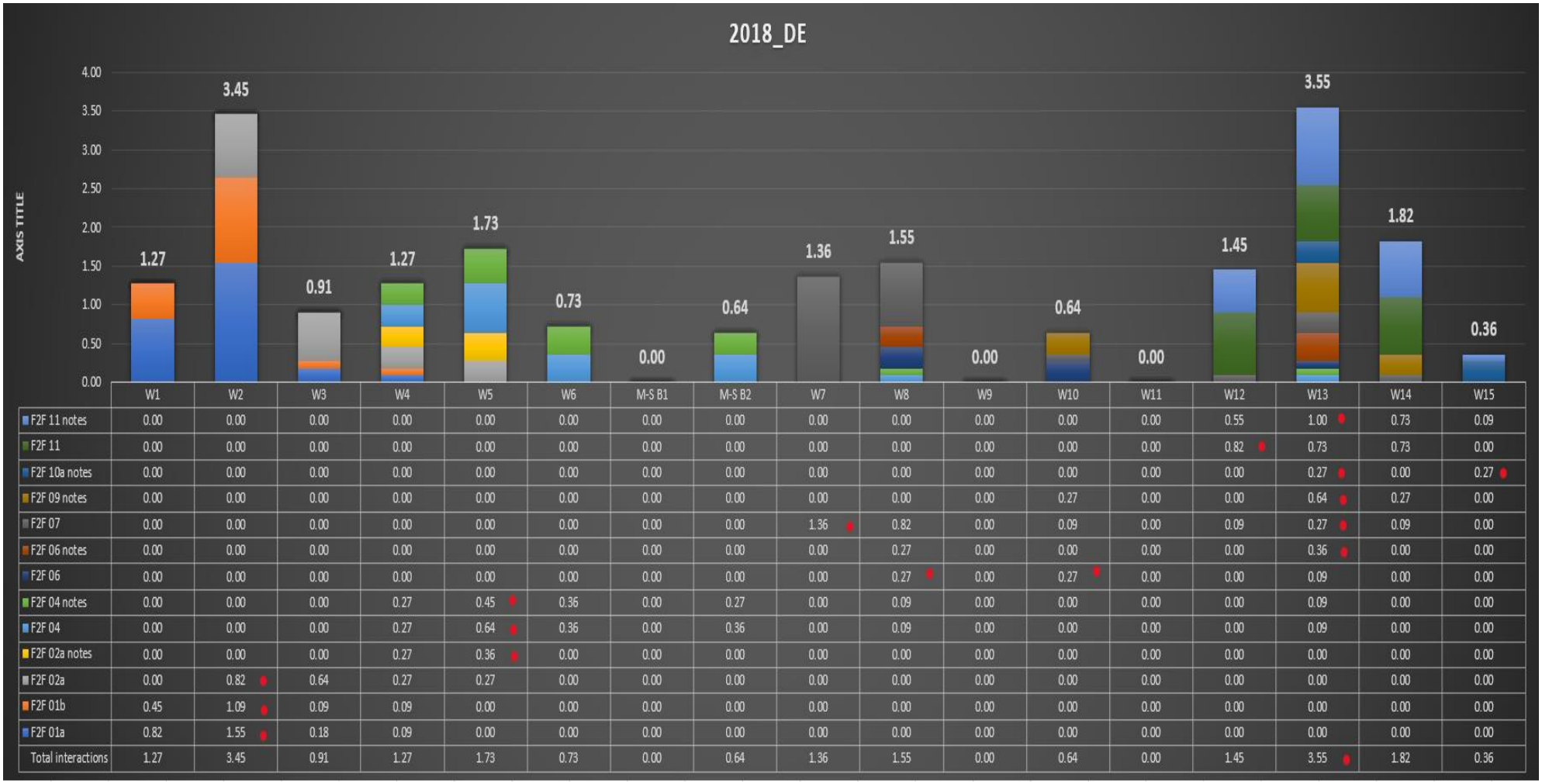
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Statement of Assessment Methods (SAM)	0.75	0.48	0.29	0.24	0.23	0.26	0.06	0.03	0.31	0.20	0.19	0.21	0.24	0.25	0.53	0.19	0.15
External tool: Online Structured Oral Examination Portal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.13
Assignment Extension	0.03	0.03	0.01	0.01	0.01	0.01	0.00	0.00	0.13	0.00	0.01	0.01	0.00	0.01	0.07	0.02	0.00
Total interactions	0.79	0.51	0.30	0.25	0.24	0.27	0.06	0.03	0.44	0.20	0.20	0.23	0.24	0.26	0.60	0.24	0.28

Figure 9.4. 31 Weekly IPS with external tools by 2019_U



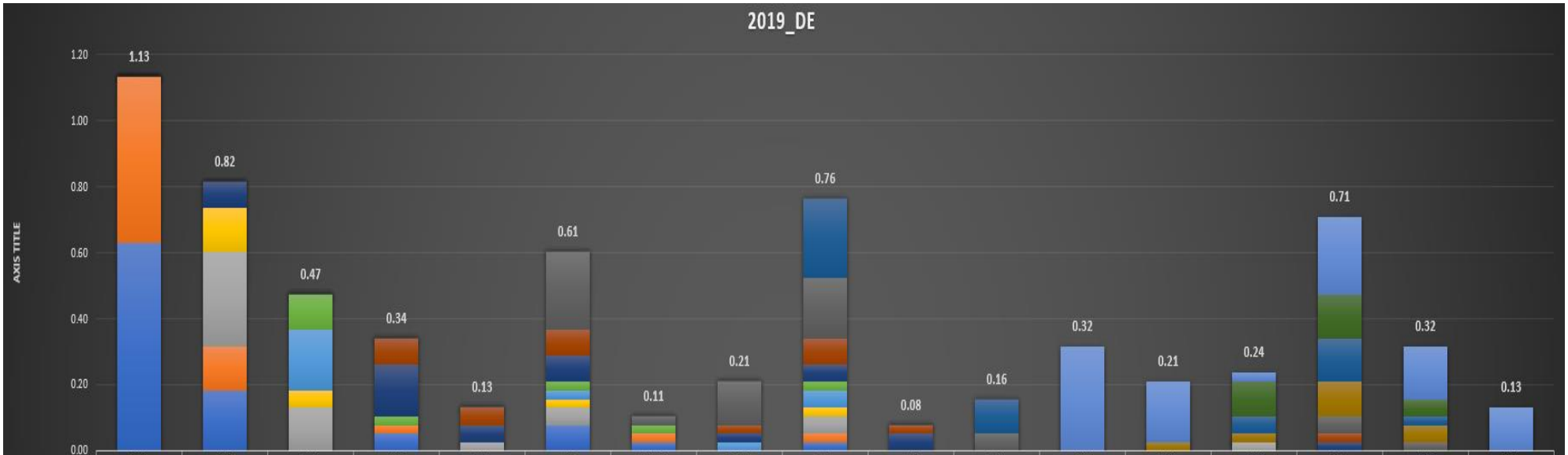
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
F2F 11 notes	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.22	0.4	0.21	0.07
F2F 11	0	0	0	0	0	0	0	0	0	0	0	0	0.11	0.32	0.67	0.22	0.07
F2F 10a notes	0	0	0	0	0	0	0	0	0	0	0	0.25	0.11	0.04	0.04	0.07	0.16
F2F 09 notes	0	0	0	0	0	0	0	0	0	0	0.17	0.08	0	0.04	0.14	0.01	0.01
F2F 07	0	0	0	0	0	0	0	0	1.1	0.37	0.07	0.04	0.05	0.04	0.06	0.06	0
F2F 06 notes	0	0	0	0	0	0	0.03	0.03	0.12	0.04	0.16	0.05	0	0.02	0.1	0.01	0.04
F2F 06	0	0	0	0	0	0.03	0.04	0.03	0.22	0.06	0.1	0.05	0.03	0.04	0.1	0.01	0.06
F2F 04 notes	0	0	0	0.15	0.36	0.13	0	0.03	0.21	0.03	0	0.01	0	0.01	0	0.01	0
F2F 04	0	0	0	0.17	0.33	0.1	0	0.04	0.15	0.06	0.04	0.01	0	0.01	0	0.03	0
F2F 02a notes	0	0	0	0.22	0.26	0.05	0	0.03	0.01	0	0.01	0	0	0.02	0	0.03	0.03
F2F 02a	0	0.29	0.34	0.27	0.15	0	0	0.06	0.08	0	0.01	0	0.03	0.02	0	0.02	0.01
F2F 01b	0.29	0.86	0.14	0.08	0.04	0	0	0	0.04	0.04	0	0	0	0.01	0	0	0
F2F 01a	0.36	1.06	0.23	0.07	0.04	0	0	0.03	0.08	0.03	0	0	0	0.01	0	0.03	0
Total interactions	0.65	2.21	0.71	0.96	1.18	0.31	0.07	0.25	2.01	0.63	0.56	0.49	0.43	0.8	1.51	0.71	0.45

Figure 9.4. 32 Weekly IPS with F2F notes by 2018_F2F



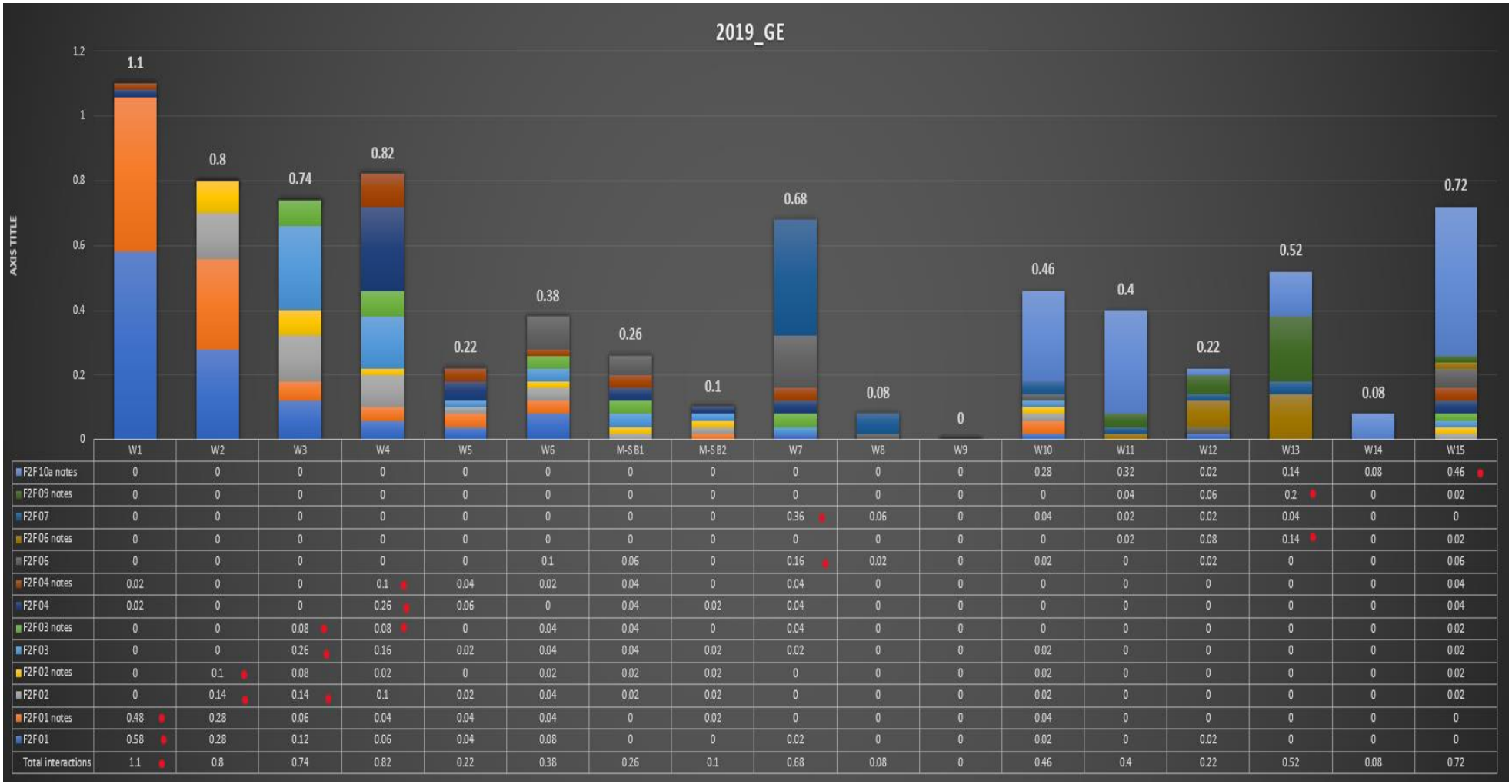
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
F2F 11 notes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	1.00	0.73	0.09
F2F 11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82	0.73	0.73	0.00
F2F 10a notes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.27
F2F 09 notes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.64	0.27	0.00
F2F 07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.36	0.82	0.00	0.09	0.00	0.09	0.27	0.09	0.00
F2F 06 notes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.00	0.00	0.36	0.00	0.00
F2F 06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.27	0.00	0.00	0.09	0.00	0.00
F2F 04 notes	0.00	0.00	0.00	0.27	0.45	0.36	0.00	0.27	0.00	0.09	0.00	0.00	0.00	0.00	0.09	0.00	0.00
F2F 04	0.00	0.00	0.00	0.27	0.64	0.36	0.00	0.36	0.00	0.09	0.00	0.00	0.00	0.00	0.09	0.00	0.00
F2F 02a notes	0.00	0.00	0.00	0.27	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F2F 02a	0.00	0.82	0.64	0.27	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F2F 01b	0.45	1.09	0.09	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F2F 01a	0.82	1.55	0.18	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total interactions	1.27	3.45	0.91	1.27	1.73	0.73	0.00	0.64	1.36	1.55	0.00	0.64	0.00	1.45	3.55	1.82	0.36

Figure 9.4. 33 Weekly IPS with F2F notes by 2018_DE



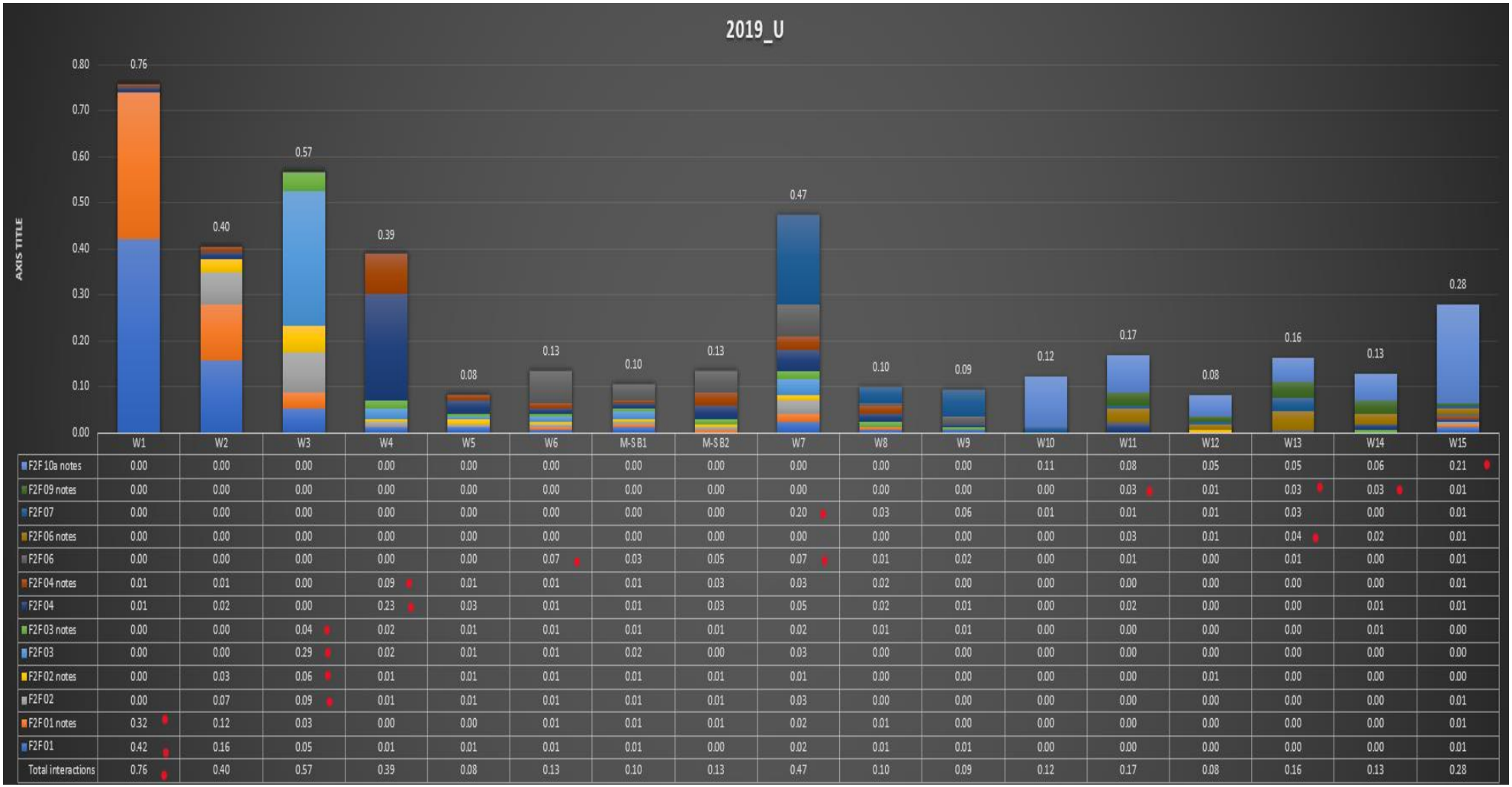
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
F2F 10a notes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.18	0.03	0.24	0.16	0.13
F2F 09 notes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.13	0.05	0.00
F2F 07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.00	0.11	0.00	0.00	0.05	0.13	0.03	0.00
F2F 06 notes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.11	0.05	0.00
F2F 06	0.00	0.00	0.00	0.00	0.00	0.24	0.03	0.13	0.18	0.00	0.05	0.00	0.00	0.00	0.05	0.03	0.00
F2F 04 notes	0.00	0.00	0.00	0.08	0.05	0.08	0.00	0.03	0.08	0.03	0.00	0.00	0.00	0.00	0.03	0.00	0.00
F2F 04	0.00	0.08	0.00	0.16	0.05	0.08	0.00	0.03	0.05	0.05	0.00	0.00	0.00	0.00	0.03	0.00	0.00
F2F 03 notes	0.00	0.00	0.11	0.03	0.00	0.03	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F2F 03	0.00	0.00	0.18	0.00	0.00	0.03	0.00	0.03	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F2F 02 notes	0.00	0.13	0.05	0.00	0.00	0.03	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F2F 02	0.00	0.29	0.13	0.00	0.03	0.05	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00
F2F 01 notes	0.50	0.13	0.00	0.03	0.00	0.00	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F2F 01	0.63	0.18	0.00	0.05	0.00	0.08	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total interactions	1.13	0.82	0.47	0.34	0.13	0.61	0.11	0.21	0.76	0.08	0.16	0.32	0.21	0.24	0.71	0.32	0.13

Figure 9.4. 34 Weekly IPS with F2F notes by 2019_DE



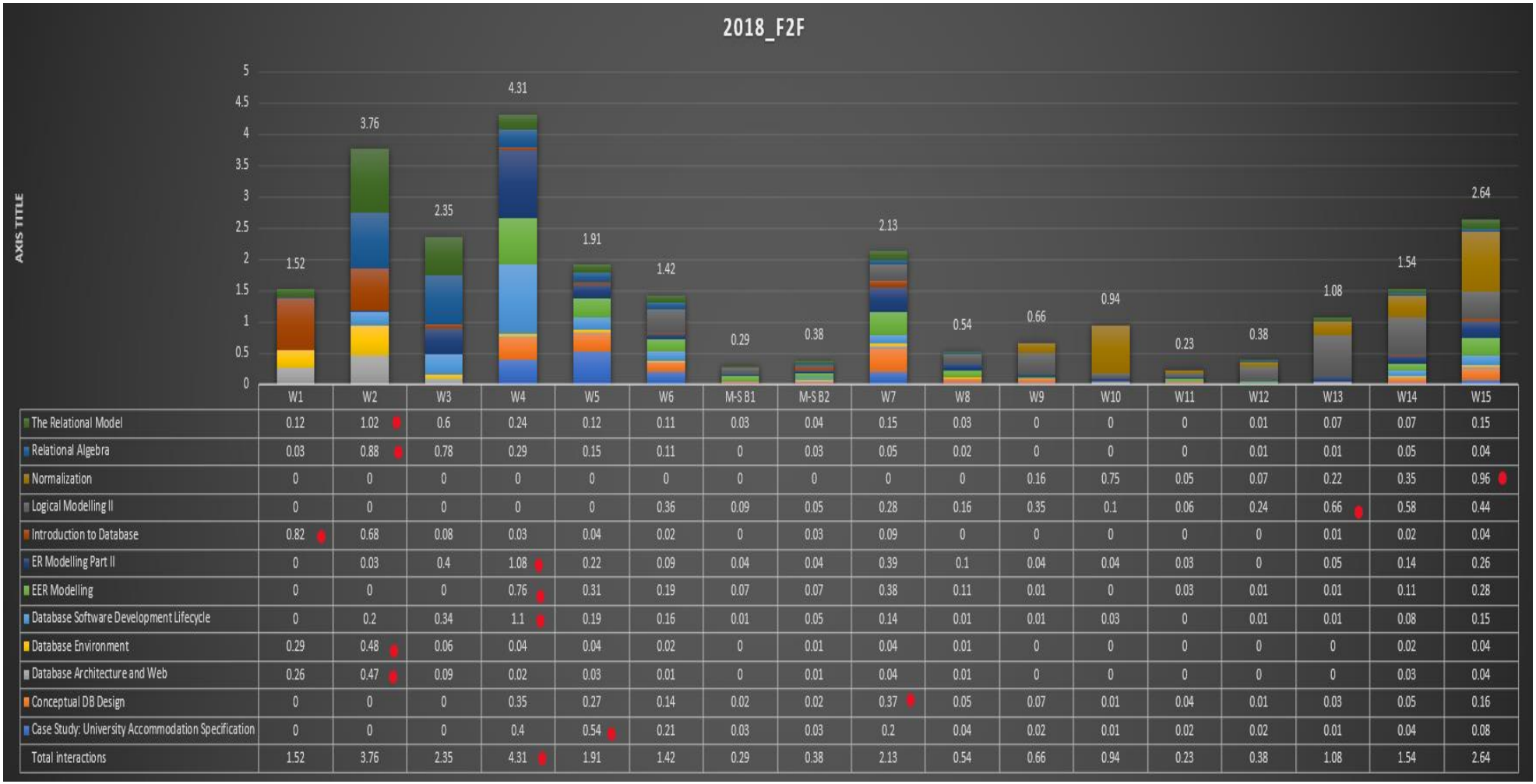
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
F2F 10a notes	0	0	0	0	0	0	0	0	0	0	0	0.28	0.32	0.02	0.14	0.08	0.46
F2F 09 notes	0	0	0	0	0	0	0	0	0	0	0	0	0.04	0.06	0.2	0	0.02
F2F 07	0	0	0	0	0	0	0	0	0.36	0.06	0	0.04	0.02	0.02	0.04	0	0
F2F 06 notes	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0.08	0.14	0	0.02
F2F 06	0	0	0	0	0	0.1	0.06	0	0.16	0.02	0	0.02	0	0.02	0	0	0.06
F2F 04 notes	0.02	0	0	0.1	0.04	0.02	0.04	0	0.04	0	0	0	0	0	0	0	0.04
F2F 04	0.02	0	0	0.26	0.06	0	0.04	0.02	0.04	0	0	0	0	0	0	0	0.04
F2F 03 notes	0	0	0.08	0.08	0	0.04	0.04	0	0.04	0	0	0	0	0	0	0	0.02
F2F 03	0	0	0.26	0.16	0.02	0.04	0.04	0.02	0.02	0	0	0.02	0	0	0	0	0.02
F2F 02 notes	0	0.1	0.08	0.02	0	0.02	0.02	0.02	0	0	0	0.02	0	0	0	0	0.02
F2F 02	0	0.14	0.14	0.1	0.02	0.04	0.02	0.02	0	0	0	0.02	0	0	0	0	0.02
F2F 01 notes	0.48	0.28	0.06	0.04	0.04	0.04	0	0.02	0	0	0	0.04	0	0	0	0	0
F2F 01	0.58	0.28	0.12	0.06	0.04	0.08	0	0	0.02	0	0	0.02	0	0.02	0	0	0
Total interactions	1.1	0.8	0.74	0.82	0.22	0.38	0.26	0.1	0.68	0.08	0	0.46	0.4	0.22	0.52	0.08	0.72

Figure 9.4. 35 Weekly IPS with F2F notes by 2019_GE



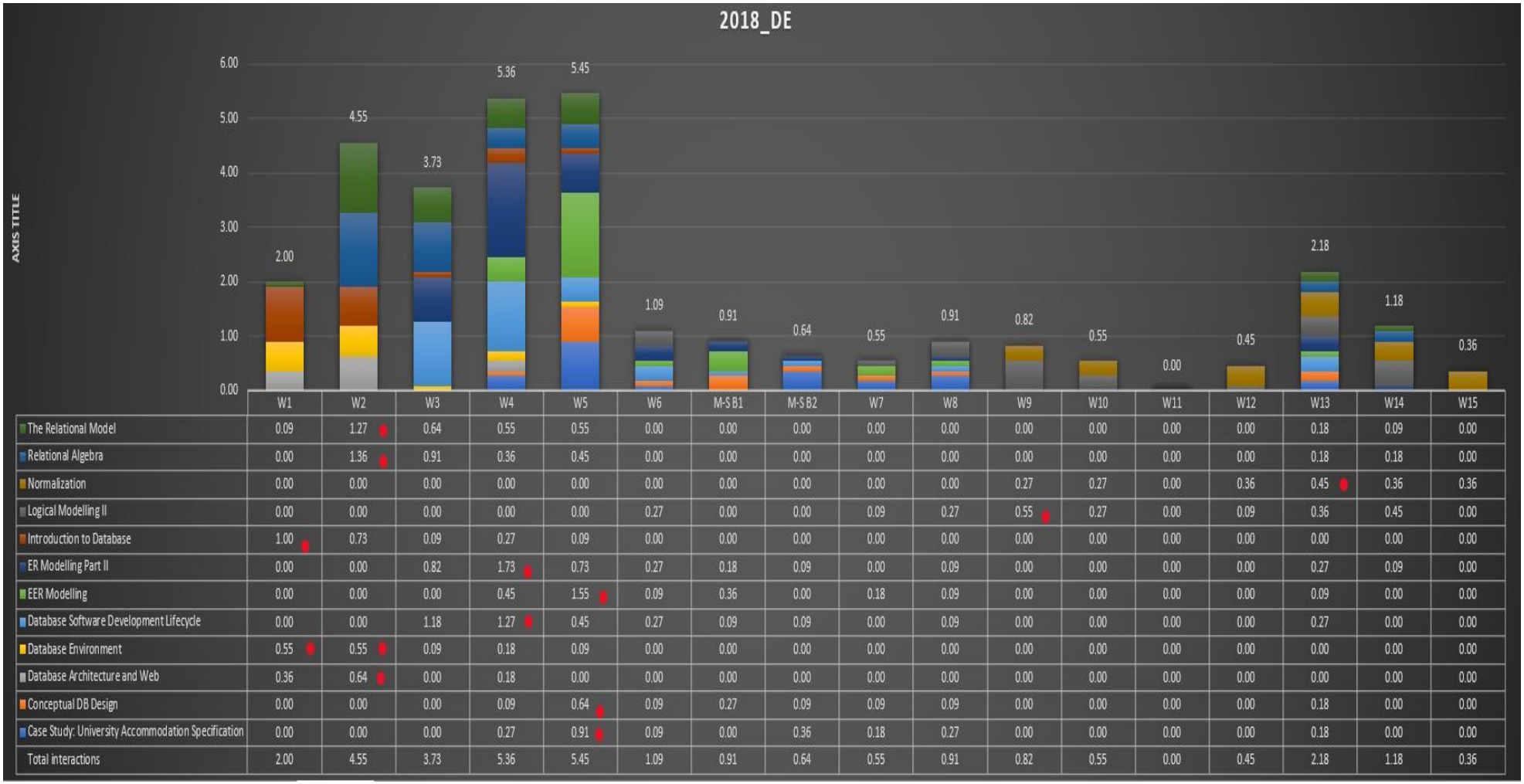
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
F2F 10a notes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.08	0.05	0.05	0.06	0.21
F2F 09 notes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.01	0.03	0.03	0.01
F2F 07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.03	0.06	0.01	0.01	0.01	0.03	0.00	0.01
F2F 06 notes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.01	0.04	0.02	0.01
F2F 06	0.00	0.00	0.00	0.00	0.00	0.07	0.03	0.05	0.07	0.01	0.02	0.00	0.01	0.00	0.01	0.00	0.01
F2F 04 notes	0.01	0.01	0.00	0.09	0.01	0.01	0.01	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.01
F2F 04	0.01	0.02	0.00	0.23	0.03	0.01	0.01	0.03	0.05	0.02	0.01	0.00	0.02	0.00	0.00	0.01	0.01
F2F 03 notes	0.00	0.00	0.04	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00
F2F 03	0.00	0.00	0.29	0.02	0.01	0.01	0.02	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F2F 02 notes	0.00	0.03	0.06	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
F2F 02	0.00	0.07	0.09	0.01	0.01	0.01	0.01	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
F2F 01 notes	0.32	0.12	0.03	0.00	0.00	0.01	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
F2F 01	0.42	0.16	0.05	0.01	0.01	0.01	0.01	0.00	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01
Total interactions	0.76	0.40	0.57	0.39	0.08	0.13	0.10	0.13	0.47	0.10	0.09	0.12	0.17	0.08	0.16	0.13	0.28

Figure 9.4. 36 Weekly IPS with F2F notes by 2019_U



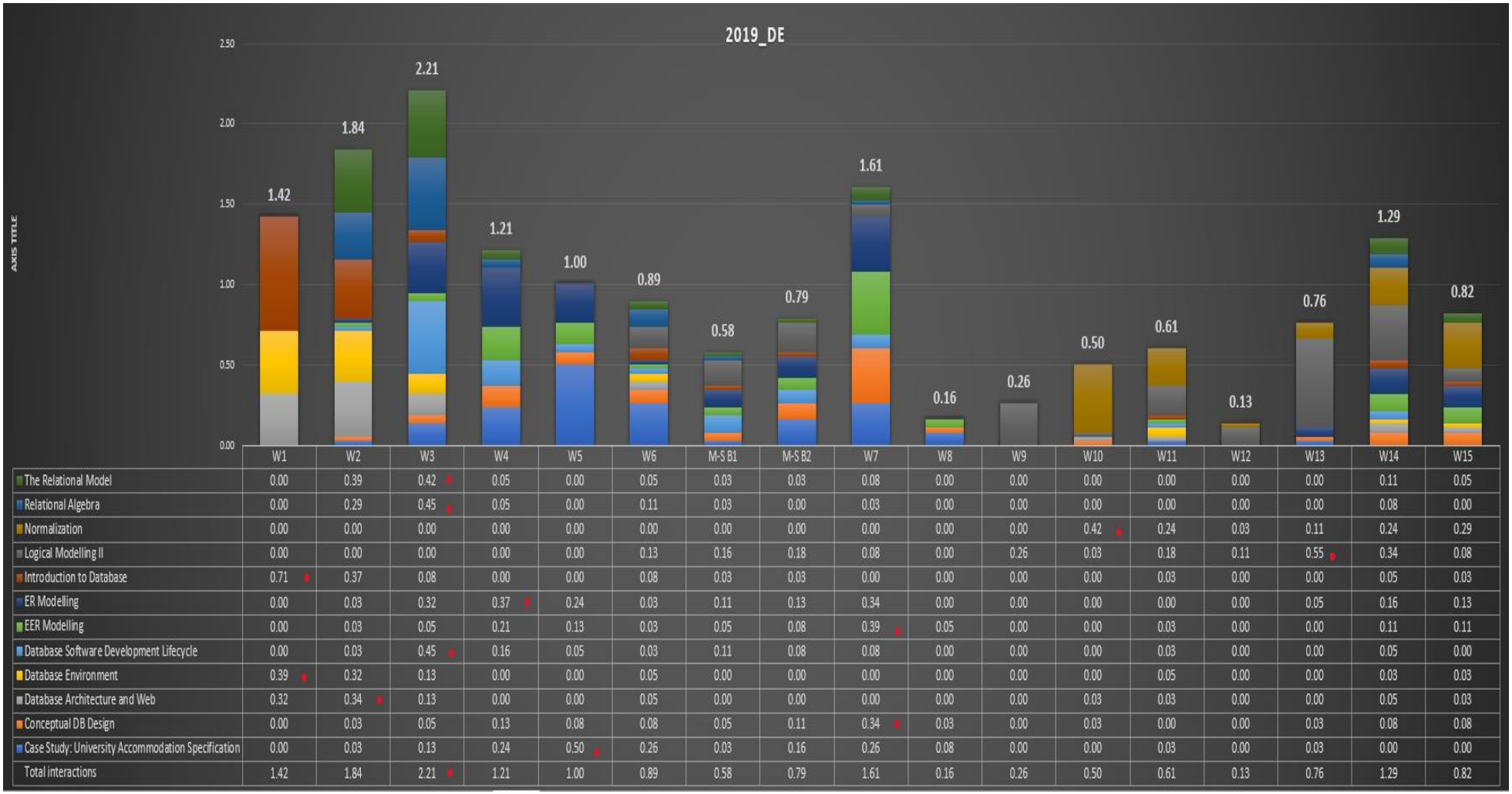
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
The Relational Model	0.12	1.02	0.6	0.24	0.12	0.11	0.03	0.04	0.15	0.03	0	0	0	0.01	0.07	0.07	0.15
Relational Algebra	0.03	0.88	0.78	0.29	0.15	0.11	0	0.03	0.05	0.02	0	0	0	0.01	0.01	0.05	0.04
Normalization	0	0	0	0	0	0	0	0	0	0	0.16	0.75	0.05	0.07	0.22	0.35	0.96
Logical Modelling II	0	0	0	0	0	0.36	0.09	0.05	0.28	0.16	0.35	0.1	0.06	0.24	0.66	0.58	0.44
Introduction to Database	0.82	0.68	0.08	0.03	0.04	0.02	0	0.03	0.09	0	0	0	0	0	0.01	0.02	0.04
ER Modelling Part II	0	0.03	0.4	1.08	0.22	0.09	0.04	0.04	0.39	0.1	0.04	0.04	0.03	0	0.05	0.14	0.26
EER Modelling	0	0	0	0.76	0.31	0.19	0.07	0.07	0.38	0.11	0.01	0	0.03	0.01	0.01	0.11	0.28
Database Software Development Lifecycle	0	0.2	0.34	1.1	0.19	0.16	0.01	0.05	0.14	0.01	0.01	0.03	0	0.01	0.01	0.08	0.15
Database Environment	0.29	0.48	0.06	0.04	0.04	0.02	0	0.01	0.04	0.01	0	0	0	0	0	0.02	0.04
Database Architecture and Web	0.26	0.47	0.09	0.02	0.03	0.01	0	0.01	0.04	0.01	0	0	0	0	0	0.03	0.04
Conceptual DB Design	0	0	0	0.35	0.27	0.14	0.02	0.02	0.37	0.05	0.07	0.01	0.04	0.01	0.03	0.05	0.16
Case Study: University Accommodation Specification	0	0	0	0.4	0.54	0.21	0.03	0.03	0.2	0.04	0.02	0.01	0.02	0.02	0.01	0.04	0.08
Total interactions	1.52	3.76	2.35	4.31	1.91	1.42	0.29	0.38	2.13	0.54	0.66	0.94	0.23	0.38	1.08	1.54	2.64

Figure 9.4. 37 Weekly IPS with theoretical course material's pdfs by 2018_F2F



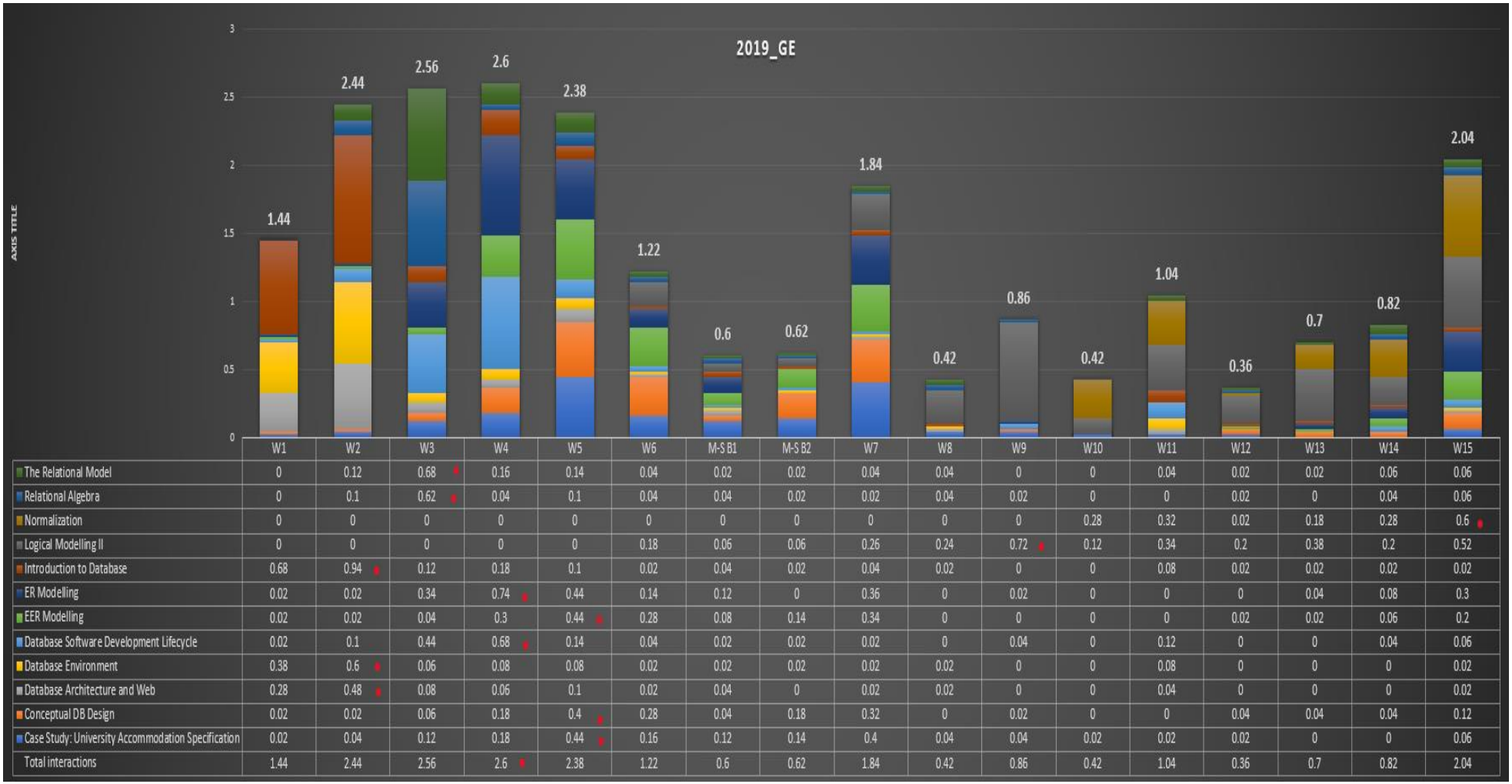
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
The Relational Model	0.09	1.27	0.64	0.55	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.09	0.00
Relational Algebra	0.00	1.36	0.91	0.36	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.18	0.00
Normalization	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.27	0.00	0.36	0.45	0.36	0.36
Logical Modelling II	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.09	0.27	0.55	0.27	0.00	0.09	0.36	0.45	0.00
Introduction to Database	1.00	0.73	0.09	0.27	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ER Modelling Part II	0.00	0.00	0.82	1.73	0.73	0.27	0.18	0.09	0.00	0.09	0.00	0.00	0.00	0.00	0.27	0.09	0.00
EER Modelling	0.00	0.00	0.00	0.45	1.55	0.09	0.36	0.00	0.18	0.09	0.00	0.00	0.00	0.00	0.09	0.00	0.00
Database Software Development Lifecycle	0.00	0.00	1.18	1.27	0.45	0.27	0.09	0.09	0.00	0.09	0.00	0.00	0.00	0.00	0.27	0.00	0.00
Database Environment	0.55	0.55	0.09	0.18	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Database Architecture and Web	0.36	0.64	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Conceptual DB Design	0.00	0.00	0.00	0.09	0.64	0.09	0.27	0.09	0.09	0.09	0.00	0.00	0.00	0.00	0.18	0.00	0.00
Case Study: University Accommodation Specification	0.00	0.00	0.00	0.27	0.91	0.09	0.00	0.36	0.18	0.27	0.00	0.00	0.00	0.00	0.18	0.00	0.00
Total interactions	2.00	4.55	3.73	5.36	5.45	1.09	0.91	0.64	0.55	0.91	0.82	0.55	0.00	0.45	2.18	1.18	0.36

Figure 9.4. 38 Weekly IPS with theoretical course material's pdfs by 2018_DE



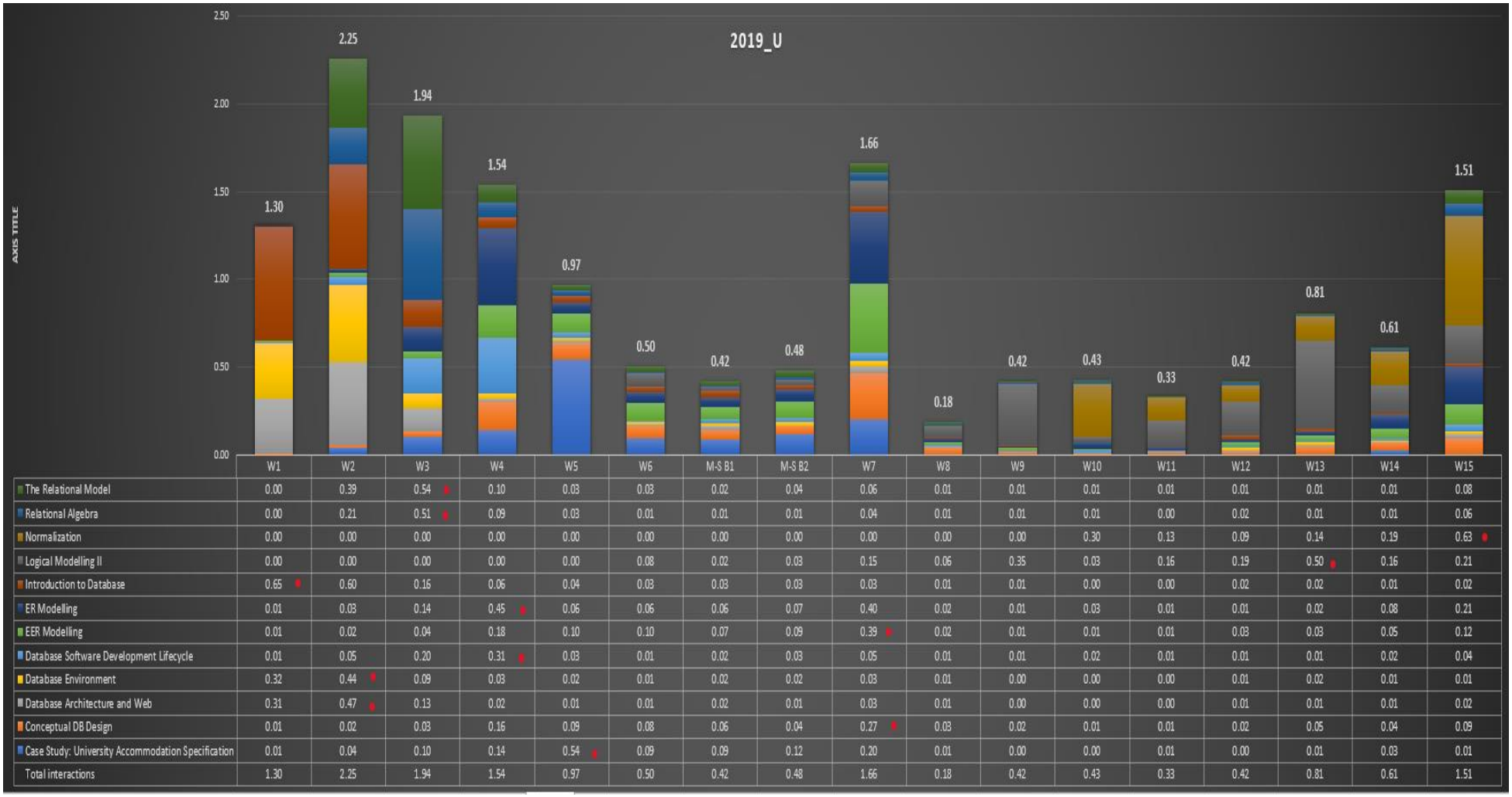
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
The Relational Model	0.00	0.39	0.42	0.05	0.00	0.05	0.03	0.03	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.05
Relational Algebra	0.00	0.29	0.45	0.05	0.00	0.11	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00
Normalization	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.24	0.03	0.11	0.24	0.29
Logical Modelling II	0.00	0.00	0.00	0.00	0.00	0.13	0.16	0.18	0.08	0.00	0.26	0.03	0.18	0.11	0.55	0.34	0.08
Introduction to Database	0.71	0.37	0.08	0.00	0.00	0.08	0.03	0.03	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.05	0.03
ER Modelling	0.00	0.03	0.32	0.37	0.24	0.03	0.11	0.13	0.34	0.00	0.00	0.00	0.00	0.00	0.05	0.16	0.13
EER Modelling	0.00	0.03	0.05	0.21	0.13	0.03	0.05	0.08	0.39	0.05	0.00	0.00	0.03	0.00	0.00	0.11	0.11
Database Software Development Lifecycle	0.00	0.03	0.45	0.16	0.05	0.03	0.11	0.08	0.08	0.00	0.00	0.00	0.03	0.00	0.00	0.05	0.00
Database Environment	0.39	0.32	0.13	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.03	0.03
Database Architecture and Web	0.32	0.34	0.13	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.05	0.03
Conceptual DB Design	0.00	0.03	0.05	0.13	0.08	0.08	0.05	0.11	0.34	0.03	0.00	0.03	0.00	0.00	0.03	0.08	0.08
Case Study: University Accommodation Specification	0.00	0.03	0.13	0.24	0.50	0.26	0.03	0.16	0.26	0.08	0.00	0.00	0.03	0.00	0.03	0.00	0.00
Total interactions	1.42	1.84	2.21	1.21	1.00	0.89	0.58	0.79	1.61	0.16	0.26	0.50	0.61	0.13	0.76	1.29	0.82

Figure 9.4. 39 Weekly IPS with theoretical course material's pdfs by 2019_DE



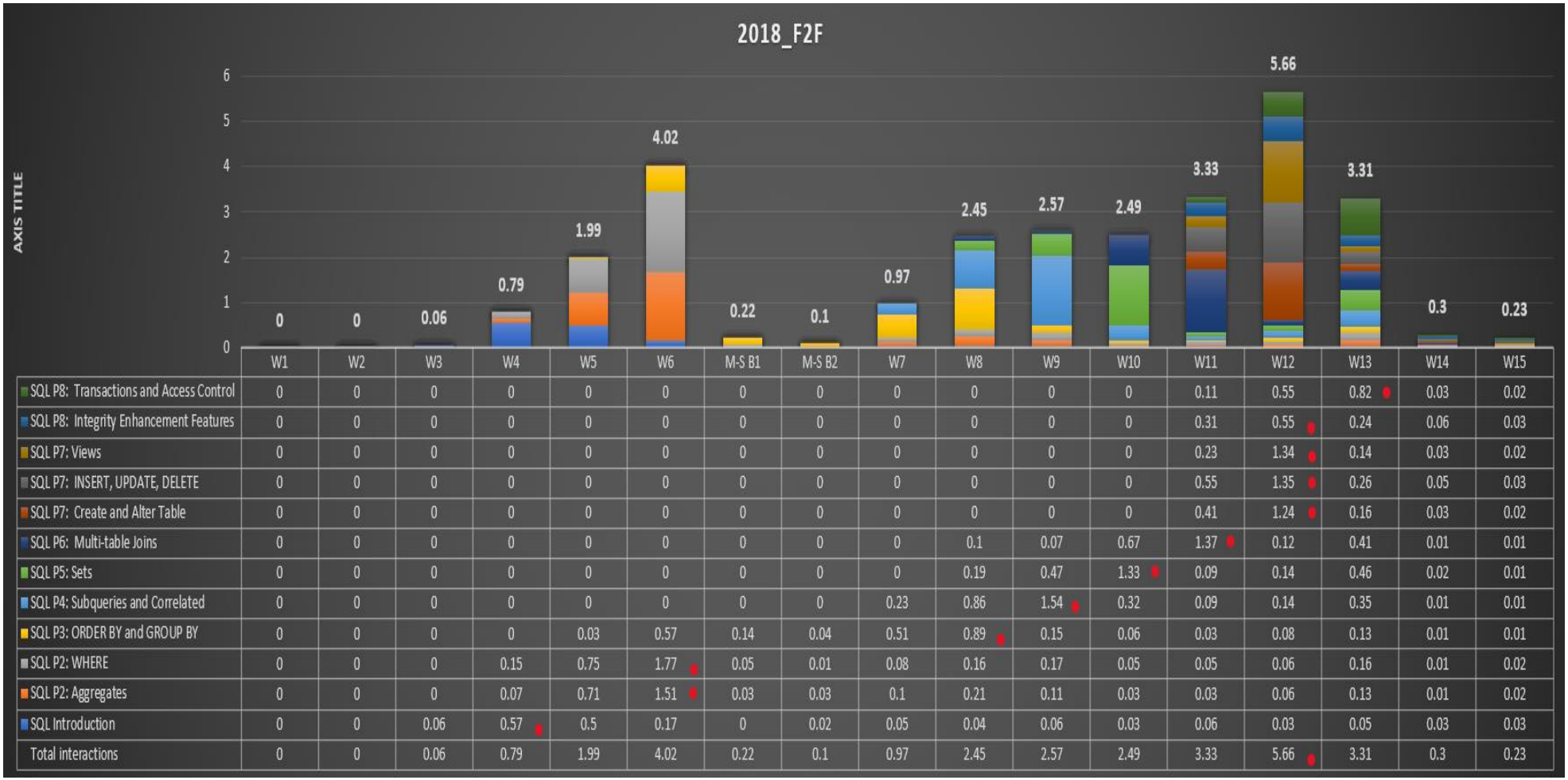
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
The Relational Model	0	0.12	0.68	0.16	0.14	0.04	0.02	0.02	0.04	0.04	0	0	0.04	0.02	0.02	0.06	0.06
Relational Algebra	0	0.1	0.62	0.04	0.1	0.04	0.04	0.02	0.02	0.04	0.02	0	0	0.02	0	0.04	0.06
Normalization	0	0	0	0	0	0	0	0	0	0	0	0.28	0.32	0.02	0.18	0.28	0.6
Logical Modelling II	0	0	0	0	0	0.18	0.06	0.06	0.26	0.24	0.72	0.12	0.34	0.2	0.38	0.2	0.52
Introduction to Database	0.68	0.94	0.12	0.18	0.1	0.02	0.04	0.02	0.04	0.02	0	0	0.08	0.02	0.02	0.02	0.02
ER Modelling	0.02	0.02	0.34	0.74	0.44	0.14	0.12	0	0.36	0	0.02	0	0	0	0.04	0.08	0.3
EER Modelling	0.02	0.02	0.04	0.3	0.44	0.28	0.08	0.14	0.34	0	0	0	0	0.02	0.02	0.06	0.2
Database Software Development Lifecycle	0.02	0.1	0.44	0.68	0.14	0.04	0.02	0.02	0.02	0	0.04	0	0.12	0	0	0.04	0.06
Database Environment	0.38	0.6	0.06	0.08	0.08	0.02	0.02	0.02	0.02	0.02	0	0	0.08	0	0	0	0.02
Database Architecture and Web	0.28	0.48	0.08	0.06	0.1	0.02	0.04	0	0.02	0.02	0	0	0.04	0	0	0	0.02
Conceptual DB Design	0.02	0.02	0.06	0.18	0.4	0.28	0.04	0.18	0.32	0	0.02	0	0	0.04	0.04	0.04	0.12
Case Study: University Accommodation Specification	0.02	0.04	0.12	0.18	0.44	0.16	0.12	0.14	0.4	0.04	0.04	0.02	0.02	0.02	0	0	0.06
Total interactions	1.44	2.44	2.56	2.6	2.38	1.22	0.6	0.62	1.84	0.42	0.86	0.42	1.04	0.36	0.7	0.82	2.04

Figure 9.4. 40 Weekly IPS with theoretical course material's pdfs by 2019_GE



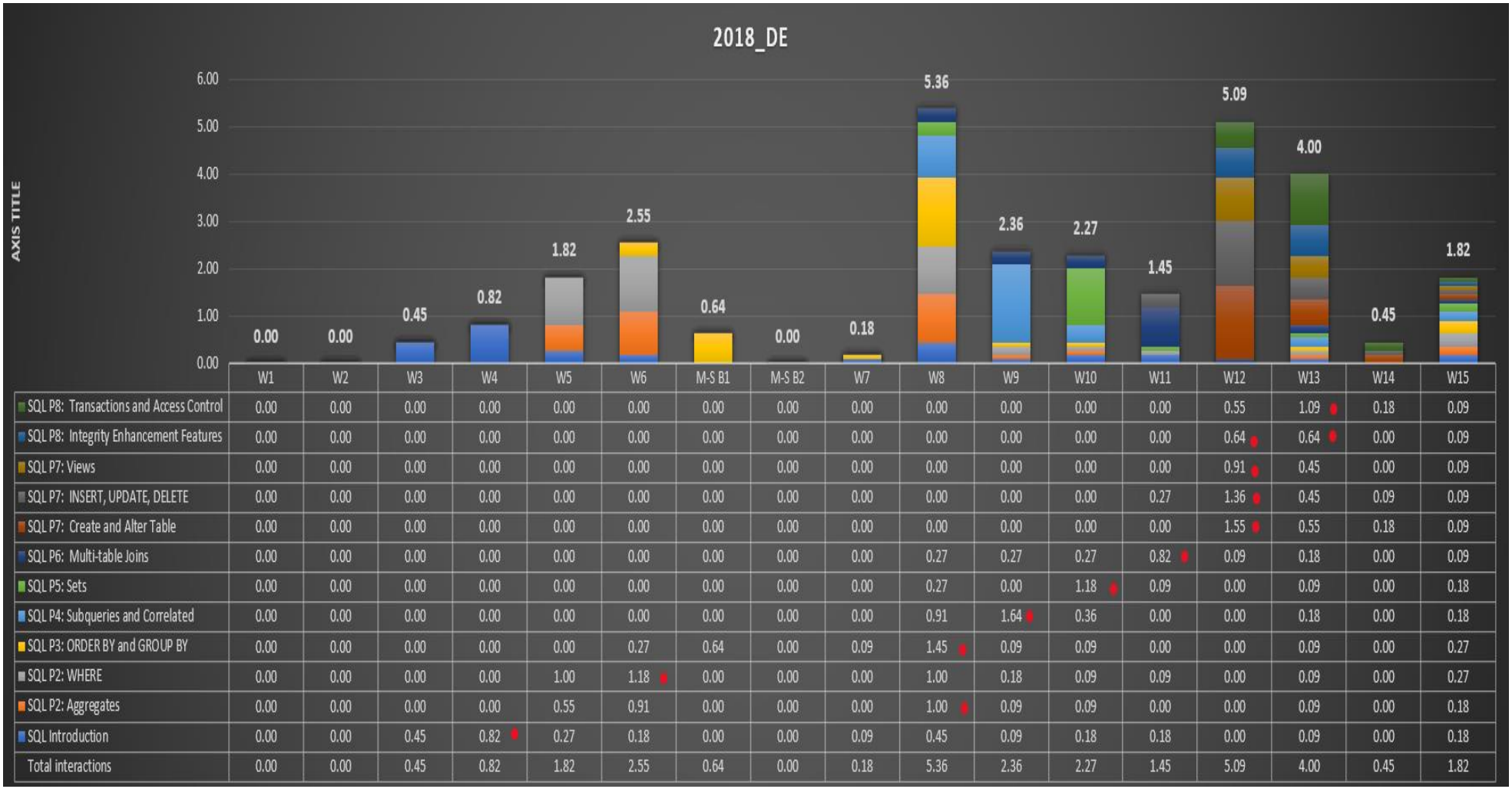
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
The Relational Model	0.00	0.39	0.54	0.10	0.03	0.03	0.02	0.04	0.06	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.08
Relational Algebra	0.00	0.21	0.51	0.09	0.03	0.01	0.01	0.01	0.04	0.01	0.01	0.01	0.00	0.02	0.01	0.01	0.06
Normalization	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.13	0.09	0.14	0.19	0.63
Logical Modelling II	0.00	0.00	0.00	0.00	0.00	0.08	0.02	0.03	0.15	0.06	0.35	0.03	0.16	0.19	0.50	0.16	0.21
Introduction to Database	0.65	0.60	0.16	0.06	0.04	0.03	0.03	0.03	0.03	0.01	0.01	0.00	0.00	0.02	0.02	0.01	0.02
ER Modelling	0.01	0.03	0.14	0.45	0.06	0.06	0.06	0.07	0.40	0.02	0.01	0.03	0.01	0.01	0.02	0.08	0.21
EER Modelling	0.01	0.02	0.04	0.18	0.10	0.10	0.07	0.09	0.39	0.02	0.01	0.01	0.01	0.03	0.03	0.05	0.12
Database Software Development Lifecycle	0.01	0.05	0.20	0.31	0.03	0.01	0.02	0.03	0.05	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.04
Database Environment	0.32	0.44	0.09	0.03	0.02	0.01	0.02	0.02	0.03	0.01	0.00	0.00	0.00	0.01	0.02	0.01	0.01
Database Architecture and Web	0.31	0.47	0.13	0.02	0.01	0.01	0.02	0.01	0.03	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.02
Conceptual DB Design	0.01	0.02	0.03	0.16	0.09	0.08	0.06	0.04	0.27	0.03	0.02	0.01	0.01	0.02	0.05	0.04	0.09
Case Study: University Accommodation Specification	0.01	0.04	0.10	0.14	0.54	0.09	0.09	0.12	0.20	0.01	0.00	0.00	0.01	0.00	0.01	0.03	0.01
Total interactions	1.30	2.25	1.94	1.54	0.97	0.50	0.42	0.48	1.66	0.18	0.42	0.43	0.33	0.42	0.81	0.61	1.51

Figure 9.4. 41 Weekly IPS with theoretical course material's pdfs by 2019_U



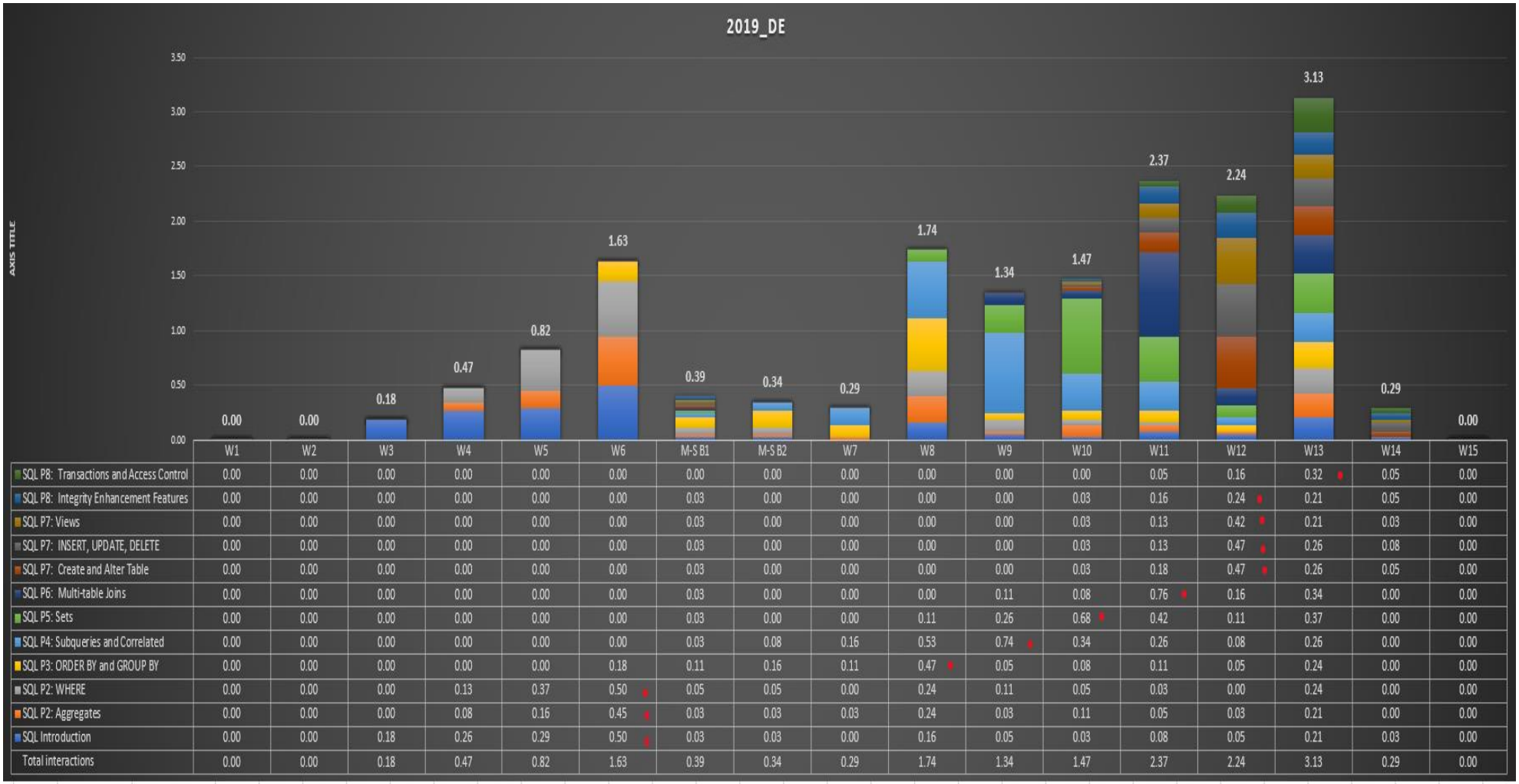
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
SQL P8: Transactions and Access Control	0	0	0	0	0	0	0	0	0	0	0	0	0.11	0.55	0.82	0.03	0.02
SQL P8: Integrity Enhancement Features	0	0	0	0	0	0	0	0	0	0	0	0	0.31	0.55	0.24	0.06	0.03
SQL P7: Views	0	0	0	0	0	0	0	0	0	0	0	0	0.23	1.34	0.14	0.03	0.02
SQL P7: INSERT, UPDATE, DELETE	0	0	0	0	0	0	0	0	0	0	0	0	0.55	1.35	0.26	0.05	0.03
SQL P7: Create and Alter Table	0	0	0	0	0	0	0	0	0	0	0	0	0.41	1.24	0.16	0.03	0.02
SQL P6: Multi-table Joins	0	0	0	0	0	0	0	0	0	0.1	0.07	0.67	1.37	0.12	0.41	0.01	0.01
SQL P5: Sets	0	0	0	0	0	0	0	0	0	0.19	0.47	1.33	0.09	0.14	0.46	0.02	0.01
SQL P4: Subqueries and Correlated	0	0	0	0	0	0	0	0	0.23	0.86	1.54	0.32	0.09	0.14	0.35	0.01	0.01
SQL P3: ORDER BY and GROUP BY	0	0	0	0	0.03	0.57	0.14	0.04	0.51	0.89	0.15	0.06	0.03	0.08	0.13	0.01	0.01
SQL P2: WHERE	0	0	0	0.15	0.75	1.77	0.05	0.01	0.08	0.16	0.17	0.05	0.05	0.06	0.16	0.01	0.02
SQL P2: Aggregates	0	0	0	0.07	0.71	1.51	0.03	0.03	0.1	0.21	0.11	0.03	0.03	0.06	0.13	0.01	0.02
SQL Introduction	0	0	0.06	0.57	0.5	0.17	0	0.02	0.05	0.04	0.06	0.03	0.06	0.03	0.05	0.03	0.03
Total interactions	0	0	0.06	0.79	1.99	4.02	0.22	0.1	0.97	2.45	2.57	2.49	3.33	5.66	3.31	0.3	0.23

Figure 9.4. 42 Weekly IPS with practical course material's pdfs by 2018_F2F



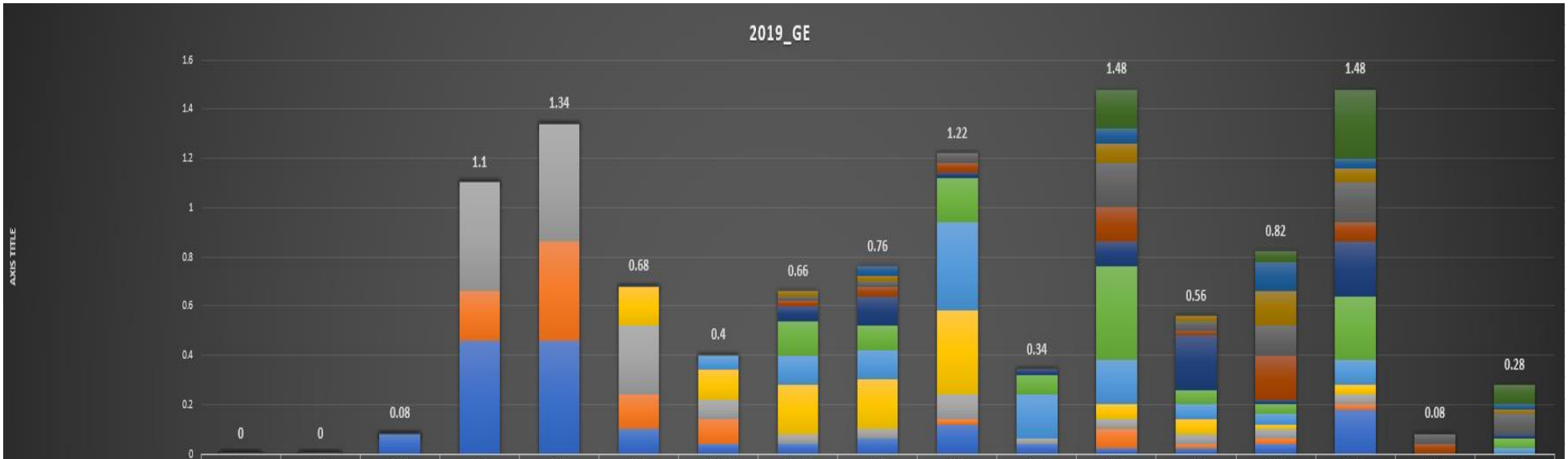
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
SQL P8: Transactions and Access Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	1.09	0.18	0.09
SQL P8: Integrity Enhancement Features	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.64	0.00	0.09
SQL P7: Views	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91	0.45	0.00	0.09
SQL P7: INSERT, UPDATE, DELETE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	1.36	0.45	0.09	0.09
SQL P7: Create and Alter Table	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.55	0.55	0.18	0.09
SQL P6: Multi-table Joins	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.27	0.27	0.82	0.09	0.18	0.00	0.09
SQL P5: Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	1.18	0.09	0.00	0.09	0.00	0.18
SQL P4: Subqueries and Correlated	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91	1.64	0.36	0.00	0.00	0.18	0.00	0.18
SQL P3: ORDER BY and GROUP BY	0.00	0.00	0.00	0.00	0.00	0.27	0.64	0.00	0.09	1.45	0.09	0.09	0.00	0.00	0.09	0.00	0.27
SQL P2: WHERE	0.00	0.00	0.00	0.00	1.00	1.18	0.00	0.00	0.00	1.00	0.18	0.09	0.09	0.00	0.09	0.00	0.27
SQL P2: Aggregates	0.00	0.00	0.00	0.00	0.55	0.91	0.00	0.00	0.00	1.00	0.09	0.09	0.00	0.00	0.09	0.00	0.18
SQL Introduction	0.00	0.00	0.45	0.82	0.27	0.18	0.00	0.00	0.09	0.45	0.09	0.18	0.18	0.00	0.09	0.00	0.18
Total interactions	0.00	0.00	0.45	0.82	1.82	2.55	0.64	0.00	0.18	5.36	2.36	2.27	1.45	5.09	4.00	0.45	1.82

Figure 9.4. 43 Weekly IPS with practical course material's pdfs by 2018_DE



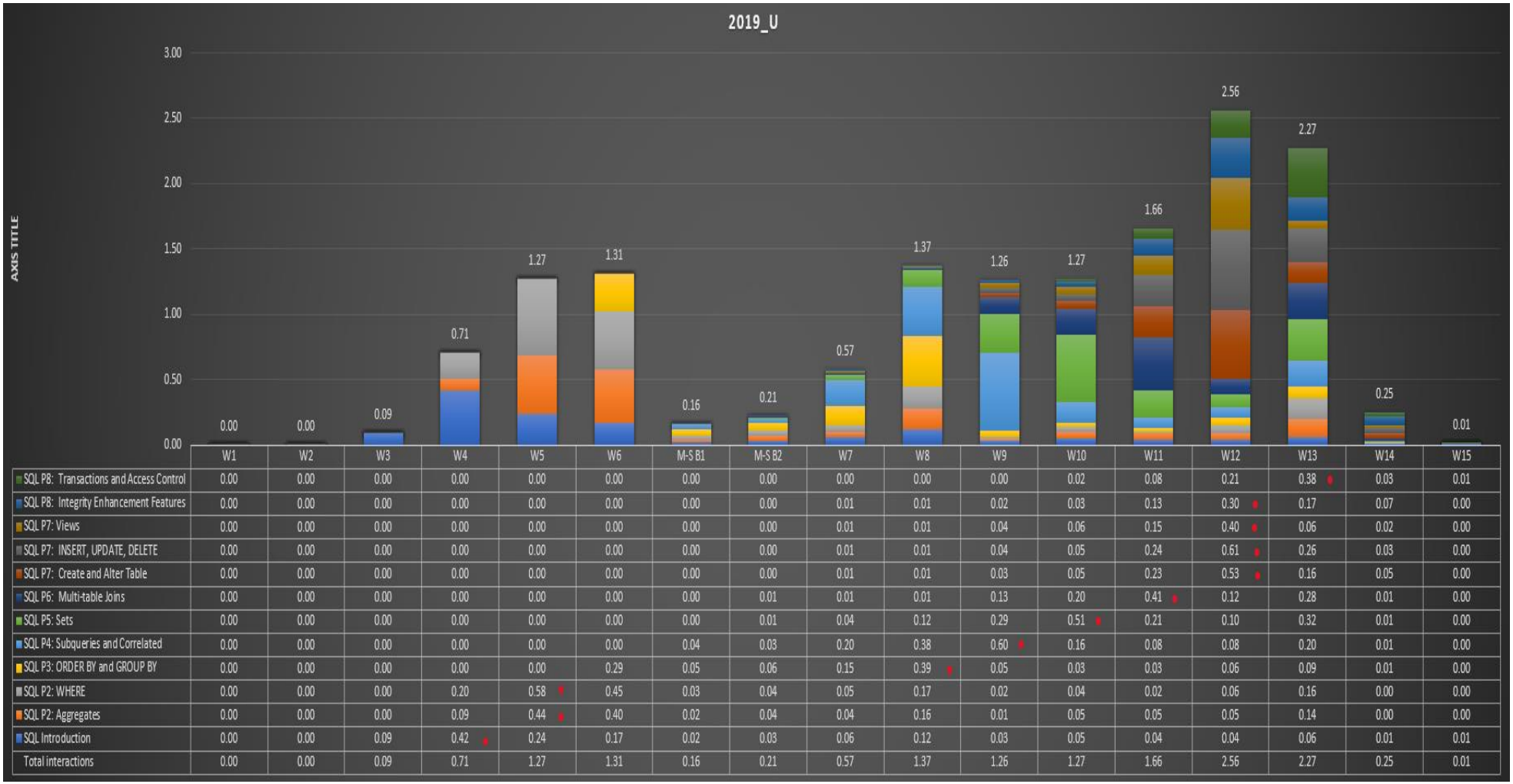
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
SQL P8: Transactions and Access Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.16	0.32	0.05	0.00
SQL P8: Integrity Enhancement Features	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.03	0.16	0.24	0.21	0.05	0.00
SQL P7: Views	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.03	0.13	0.42	0.21	0.03	0.00
SQL P7: INSERT, UPDATE, DELETE	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.03	0.13	0.47	0.26	0.08	0.00
SQL P7: Create and Alter Table	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.03	0.18	0.47	0.26	0.05	0.00
SQL P6: Multi-table Joins	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.11	0.08	0.76	0.16	0.34	0.00	0.00
SQL P5: Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.11	0.26	0.68	0.42	0.11	0.37	0.00	0.00
SQL P4: Subqueries and Correlated	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.08	0.16	0.53	0.74	0.34	0.26	0.08	0.26	0.00	0.00
SQL P3: ORDER BY and GROUP BY	0.00	0.00	0.00	0.00	0.00	0.18	0.11	0.16	0.11	0.47	0.05	0.08	0.11	0.05	0.24	0.00	0.00
SQL P2: WHERE	0.00	0.00	0.00	0.13	0.37	0.50	0.05	0.05	0.00	0.24	0.11	0.05	0.03	0.00	0.24	0.00	0.00
SQL P2: Aggregates	0.00	0.00	0.00	0.08	0.16	0.45	0.03	0.03	0.03	0.24	0.03	0.11	0.05	0.03	0.21	0.00	0.00
SQL Introduction	0.00	0.00	0.18	0.26	0.29	0.50	0.03	0.03	0.00	0.16	0.05	0.03	0.08	0.05	0.21	0.03	0.00
Total interactions	0.00	0.00	0.18	0.47	0.82	1.63	0.39	0.34	0.29	1.74	1.34	1.47	2.37	2.24	3.13	0.29	0.00

Figure 9.4. 44 Weekly IPS with practical course material's pdfs by 2019_DE



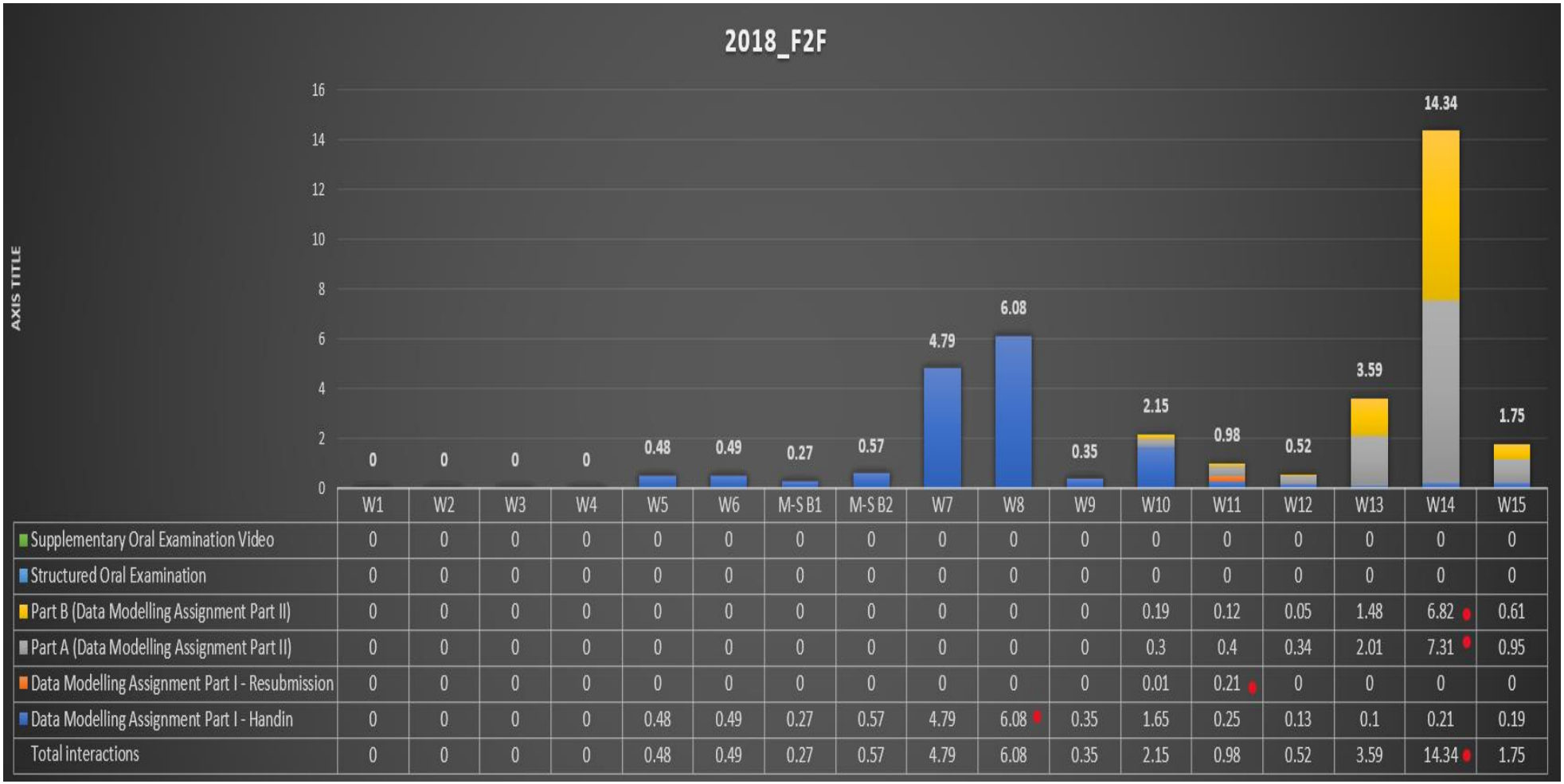
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
SQL P8: Transactions and Access Control	0	0	0	0	0	0	0	0	0	0	0	0.16	0	0.04	0.28	0	0.08
SQL P8: Integrity Enhancement Features	0	0	0	0	0	0	0	0	0.04	0	0	0.06	0	0.12	0.04	0	0.02
SQL P7: Views	0	0	0	0	0	0	0	0.02	0.02	0	0	0.08	0.02	0.14	0.06	0	0.02
SQL P7: INSERT, UPDATE, DELETE	0	0	0	0	0	0	0	0.02	0.02	0.04	0	0.18	0.04	0.12	0.16	0.04	0.08
SQL P7: Create and Alter Table	0	0	0	0	0	0	0	0.02	0.04	0.04	0	0.14	0.02	0.18	0.08	0.04	0
SQL P6: Multi-table Joins	0	0	0	0	0	0	0	0.06	0.12	0.02	0.02	0.1	0.22	0.02	0.22	0	0.02
SQL P5: Sets	0	0	0	0	0	0	0	0.14	0.1	0.18	0.08	0.38	0.06	0.04	0.26	0	0.04
SQL P4: Subqueries and Correlated	0	0	0	0	0	0	0.06	0.12	0.12	0.36	0.18	0.18	0.06	0.04	0.1	0	0.02
SQL P3: ORDER BY and GROUP BY	0	0	0	0	0	0.16	0.12	0.2	0.2	0.34	0	0.06	0.06	0.02	0.04	0	0
SQL P2: WHERE	0	0	0	0.44	0.48	0.28	0.08	0.04	0.04	0.1	0.02	0.04	0.04	0.04	0.04	0	0
SQL P2: Aggregates	0	0	0	0.2	0.4	0.14	0.1	0	0	0.02	0	0.08	0.02	0.02	0.02	0	0
SQL Introduction	0	0	0.08	0.46	0.46	0.1	0.04	0.04	0.06	0.12	0.04	0.02	0.02	0.04	0.18	0	0
Total interactions	0	0	0.08	1.1	1.34	0.68	0.4	0.66	0.76	1.22	0.34	1.48	0.56	0.82	1.48	0.08	0.28

Figure 9.4. 45 Weekly IPS with practical course material's pdfs by 2019_GE



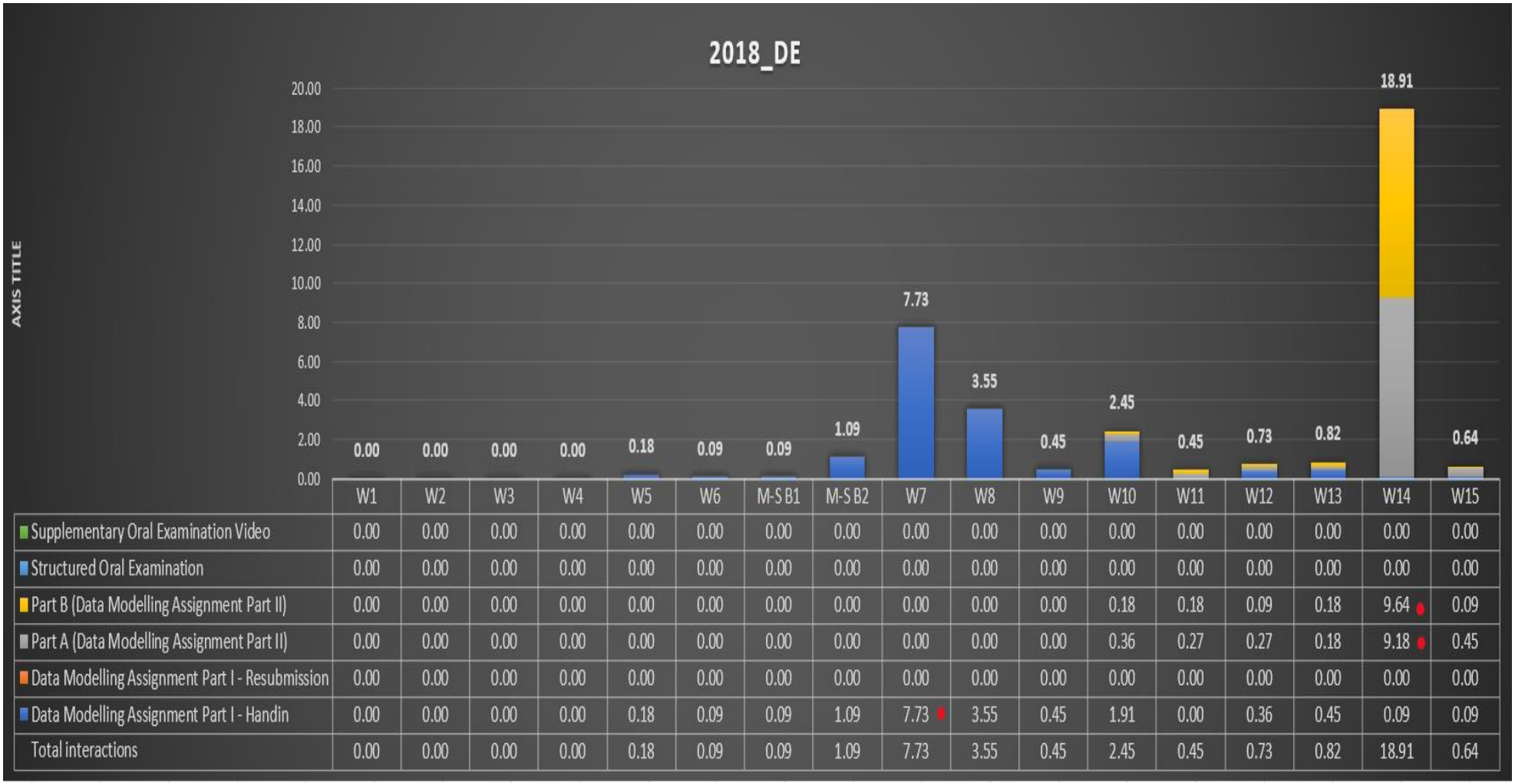
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
SQL P8: Transactions and Access Control	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.08	0.21	0.38	0.03	0.01
SQL P8: Integrity Enhancement Features	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.13	0.30	0.17	0.07	0.00
SQL P7: Views	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.04	0.06	0.15	0.40	0.06	0.02	0.00
SQL P7: INSERT, UPDATE, DELETE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.04	0.05	0.24	0.61	0.26	0.03	0.00
SQL P7: Create and Alter Table	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.05	0.23	0.53	0.16	0.05	0.00
SQL P6: Multi-table Joins	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.13	0.20	0.41	0.12	0.28	0.01	0.00
SQL P5: Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.12	0.29	0.51	0.21	0.10	0.32	0.01	0.00
SQL P4: Subqueries and Correlated	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.03	0.20	0.38	0.60	0.16	0.08	0.08	0.20	0.01	0.00
SQL P3: ORDER BY and GROUP BY	0.00	0.00	0.00	0.00	0.00	0.29	0.05	0.06	0.15	0.39	0.05	0.03	0.03	0.06	0.09	0.01	0.00
SQL P2: WHERE	0.00	0.00	0.00	0.20	0.58	0.45	0.03	0.04	0.05	0.17	0.02	0.04	0.02	0.06	0.16	0.00	0.00
SQL P2: Aggregates	0.00	0.00	0.00	0.09	0.44	0.40	0.02	0.04	0.04	0.16	0.01	0.05	0.05	0.05	0.14	0.00	0.00
SQL Introduction	0.00	0.00	0.09	0.42	0.24	0.17	0.02	0.03	0.06	0.12	0.03	0.05	0.04	0.04	0.06	0.01	0.01
Total interactions	0.00	0.00	0.09	0.71	1.27	1.31	0.16	0.21	0.57	1.37	1.26	1.27	1.66	2.56	2.27	0.25	0.01

Figure 9.4. 46 Weekly IPS with practical course material's pdfs by 2019_U



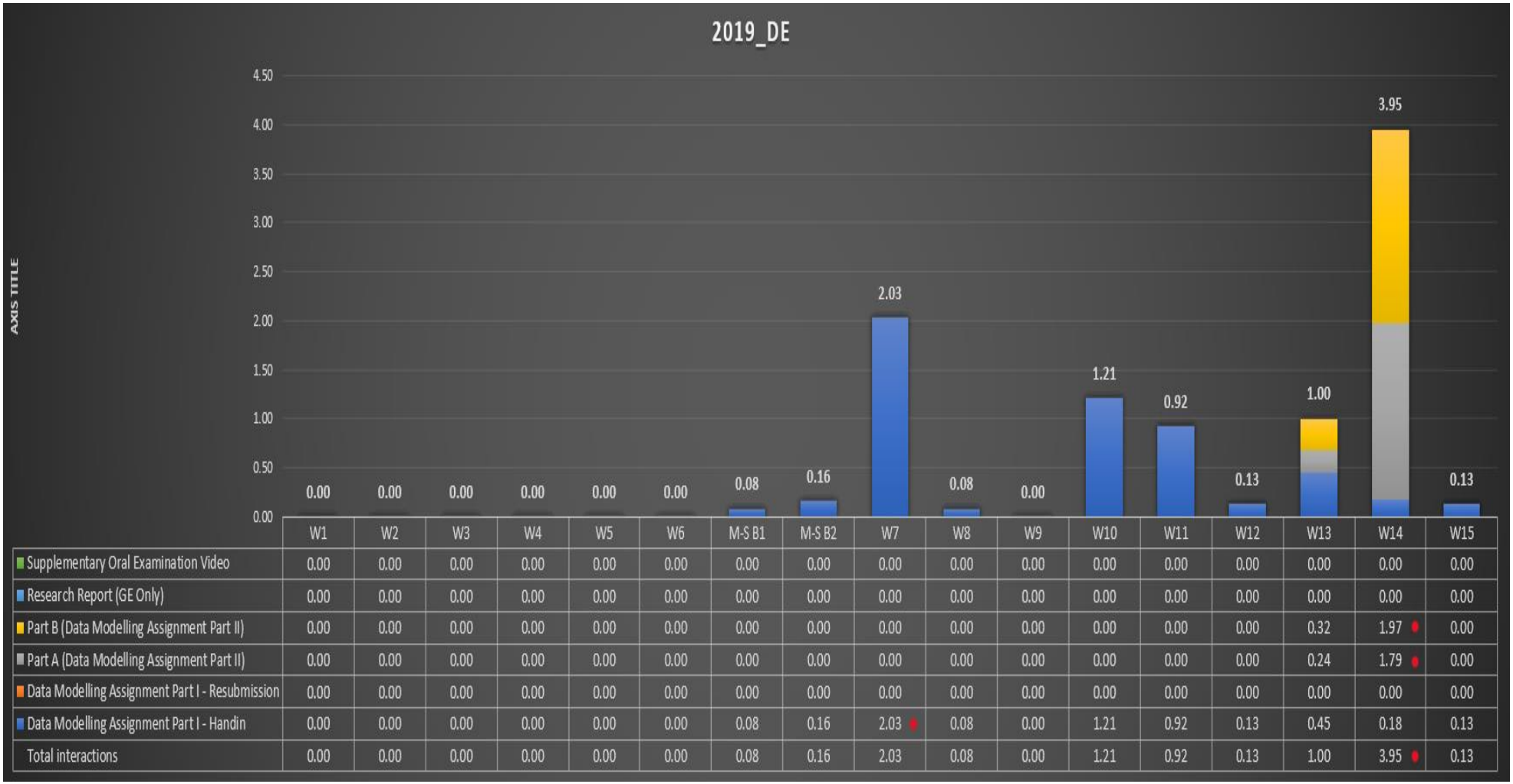
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Supplementary Oral Examination Video	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Structured Oral Examination	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Part B (Data Modelling Assignment Part II)	0	0	0	0	0	0	0	0	0	0	0	0.19	0.12	0.05	1.48	6.82	0.61
Part A (Data Modelling Assignment Part II)	0	0	0	0	0	0	0	0	0	0	0	0.3	0.4	0.34	2.01	7.31	0.95
Data Modelling Assignment Part I - Resubmission	0	0	0	0	0	0	0	0	0	0	0	0.01	0.21	0	0	0	0
Data Modelling Assignment Part I - Handin	0	0	0	0	0.48	0.49	0.27	0.57	4.79	6.08	0.35	1.65	0.25	0.13	0.1	0.21	0.19
Total interactions	0	0	0	0	0.48	0.49	0.27	0.57	4.79	6.08	0.35	2.15	0.98	0.52	3.59	14.34	1.75

Figure 9.4. 47 Weekly IPS with assignments by 2018_F2F



	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Supplementary Oral Examination Video	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Structured Oral Examination	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Part B (Data Modelling Assignment Part II)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.18	0.09	0.18	9.64	0.09
Part A (Data Modelling Assignment Part II)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.27	0.27	0.18	9.18	0.45
Data Modelling Assignment Part I - Resubmission	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Data Modelling Assignment Part I - Handin	0.00	0.00	0.00	0.00	0.18	0.09	0.09	1.09	7.73	3.55	0.45	1.91	0.00	0.36	0.45	0.09	0.09
Total interactions	0.00	0.00	0.00	0.00	0.18	0.09	0.09	1.09	7.73	3.55	0.45	2.45	0.45	0.73	0.82	18.91	0.64

Figure 9.4. 48 Weekly IPS with assignments by 2018_DE



	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Supplementary Oral Examination Video	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Research Report (GE Only)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Part B (Data Modelling Assignment Part II)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	1.97	0.00
Part A (Data Modelling Assignment Part II)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	1.79	0.00
Data Modelling Assignment Part I - Resubmission	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Data Modelling Assignment Part I - Handin	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.16	2.03	0.08	0.00	1.21	0.92	0.13	0.45	0.18	0.13
Total interactions	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.16	2.03	0.08	0.00	1.21	0.92	0.13	1.00	3.95	0.13

Figure 9.4. 49 Weekly IPS with assignments by 2019_DE

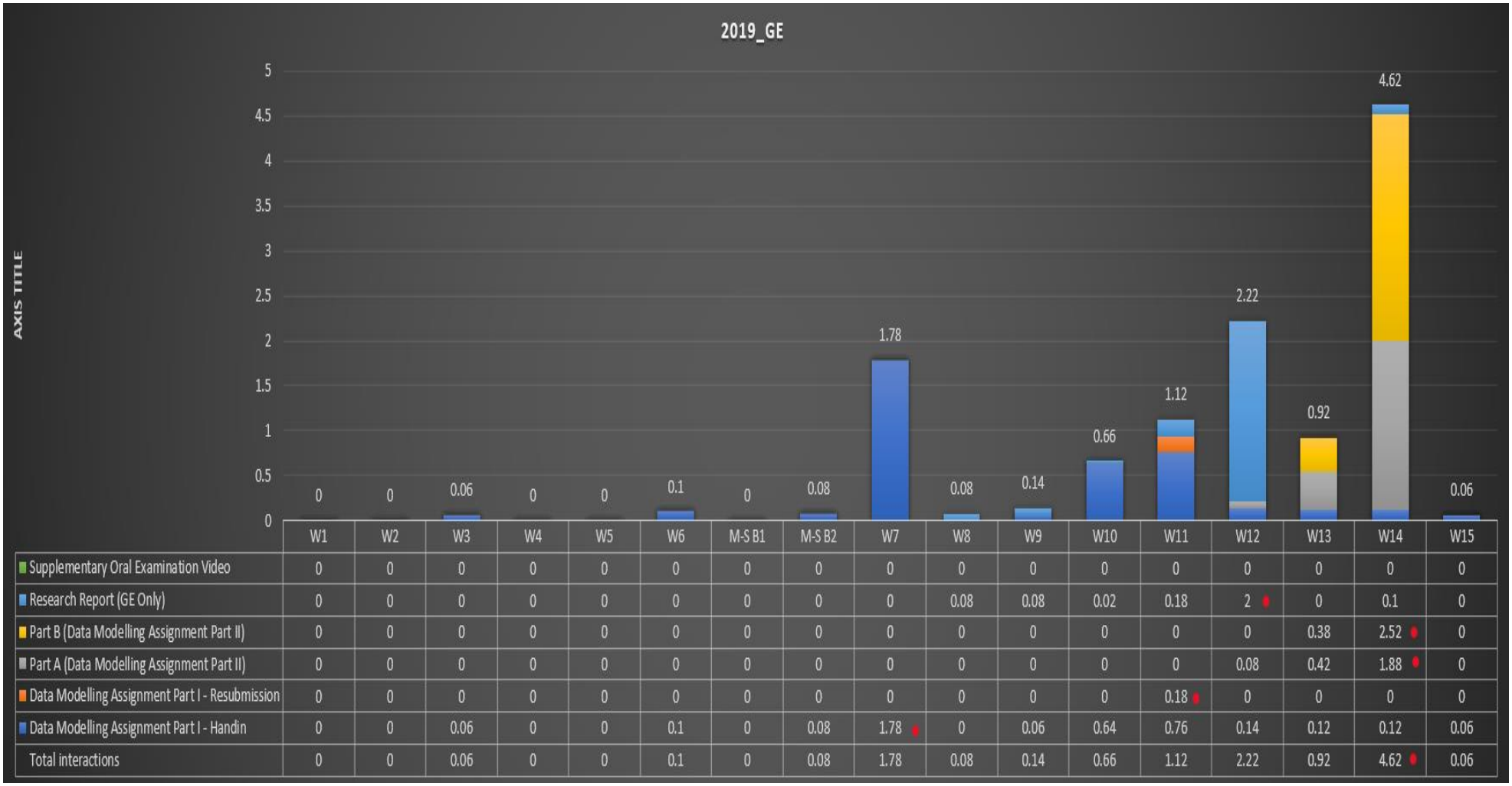
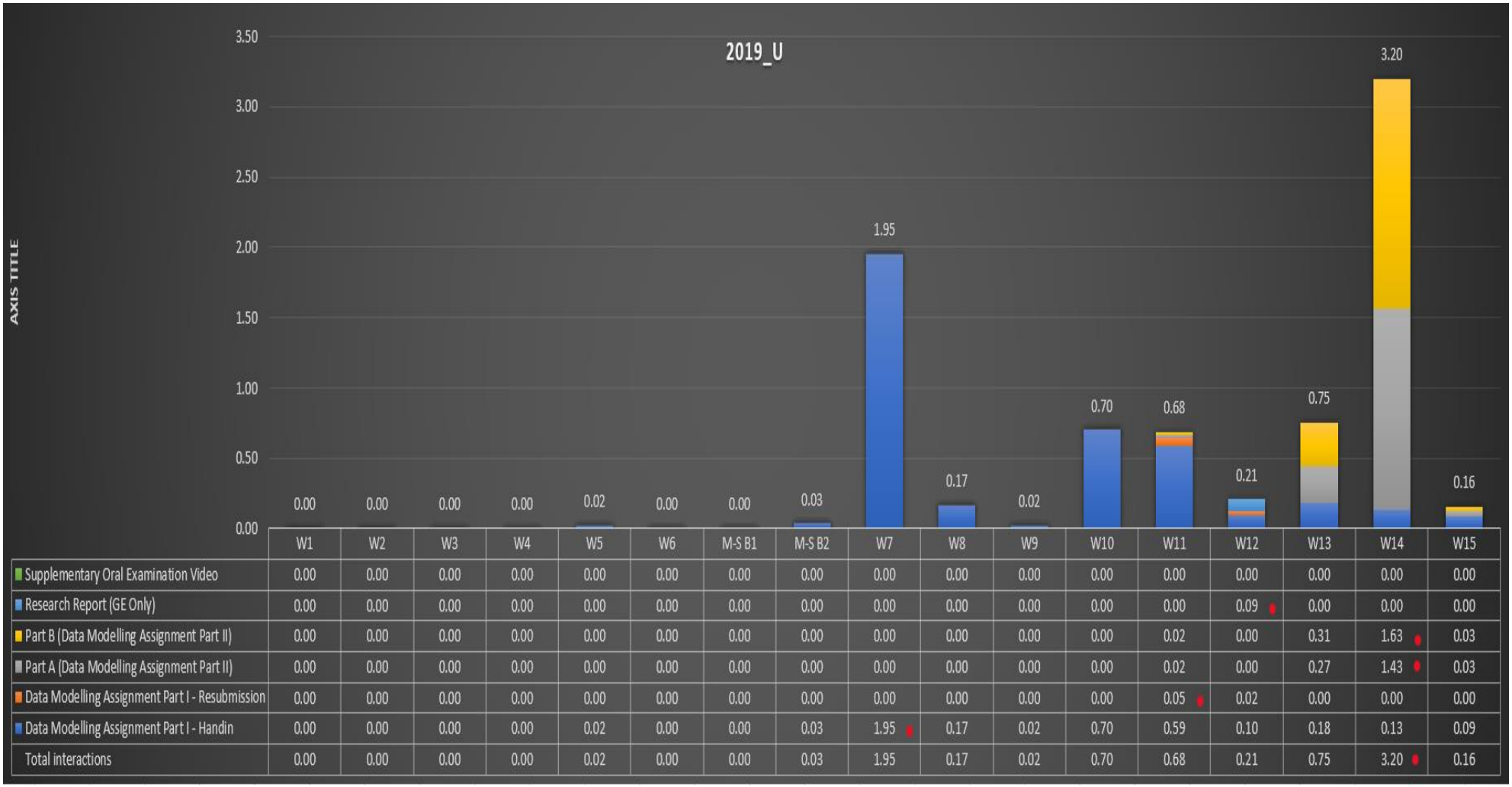
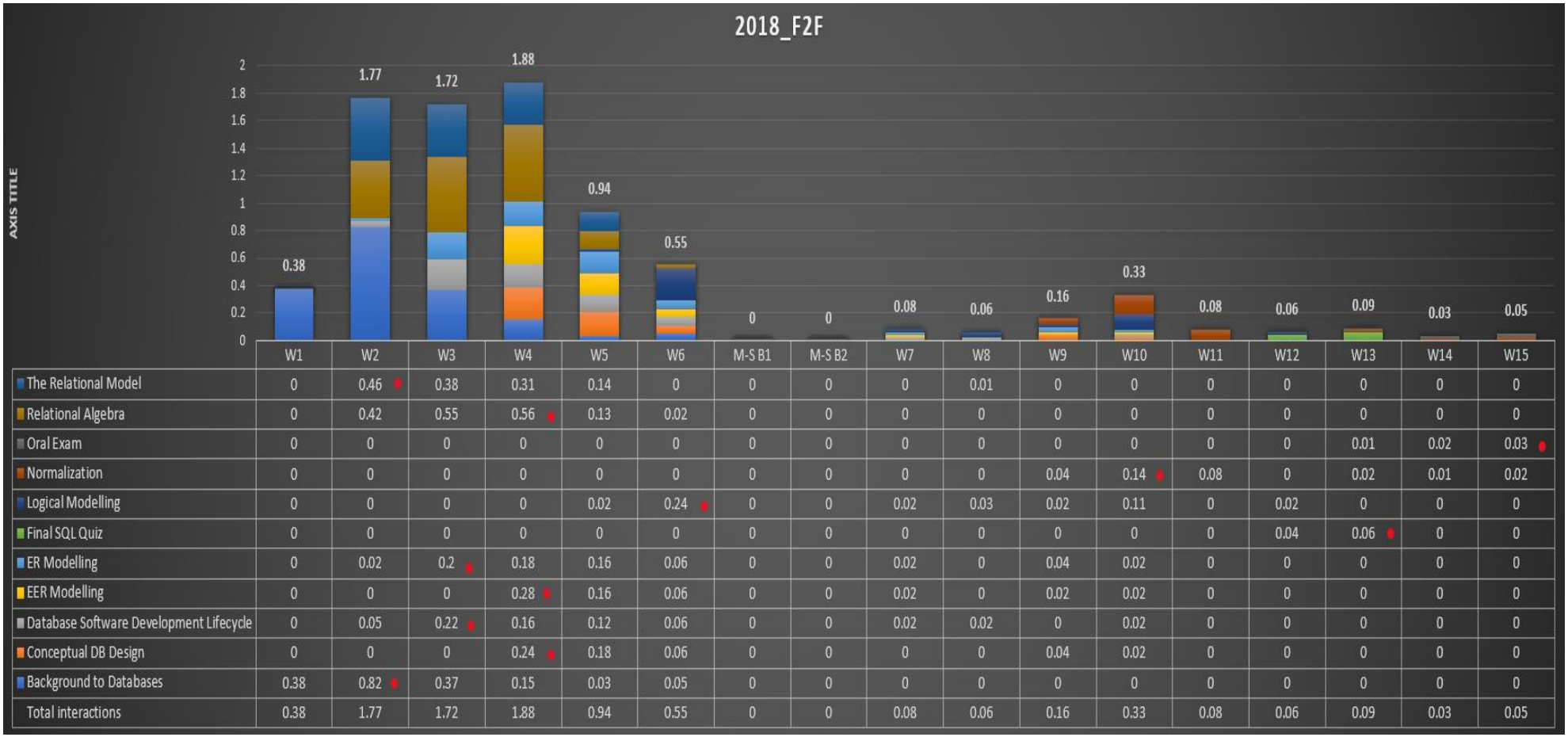


Figure 9.4. 50 Weekly IPS with assignments by 2019_GE



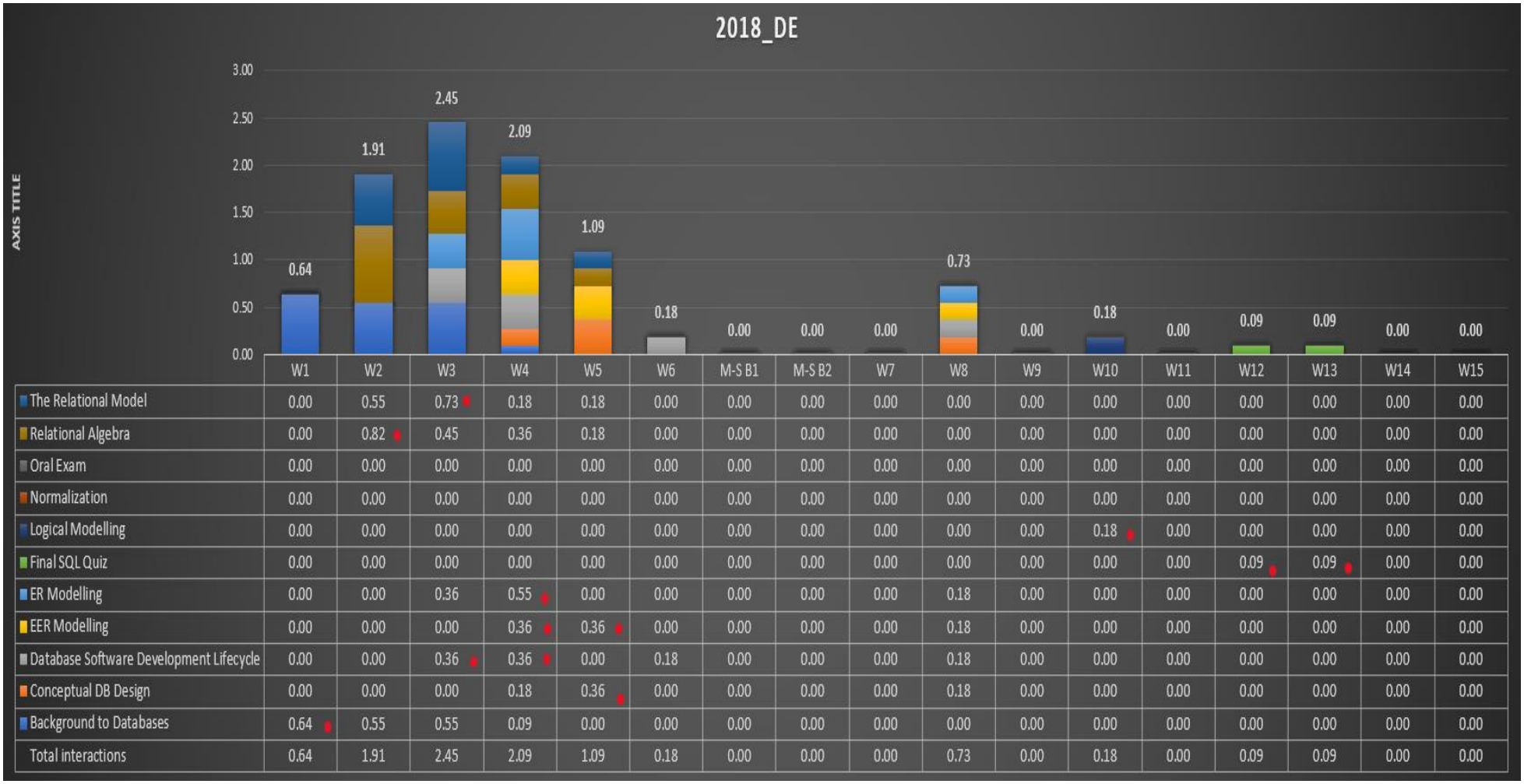
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
Supplementary Oral Examination Video	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Research Report (GE Only)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00
Part B (Data Modelling Assignment Part II)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.31	1.63	0.03
Part A (Data Modelling Assignment Part II)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.27	1.43	0.03
Data Modelling Assignment Part I - Resubmission	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.02	0.00	0.00	0.00
Data Modelling Assignment Part I - Handin	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.03	1.95	0.17	0.02	0.70	0.59	0.10	0.18	0.13	0.09
Total interactions	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.03	1.95	0.17	0.02	0.70	0.68	0.21	0.75	3.20	0.16

Figure 9.4. 51 Weekly IPS with assignments by 2019_U



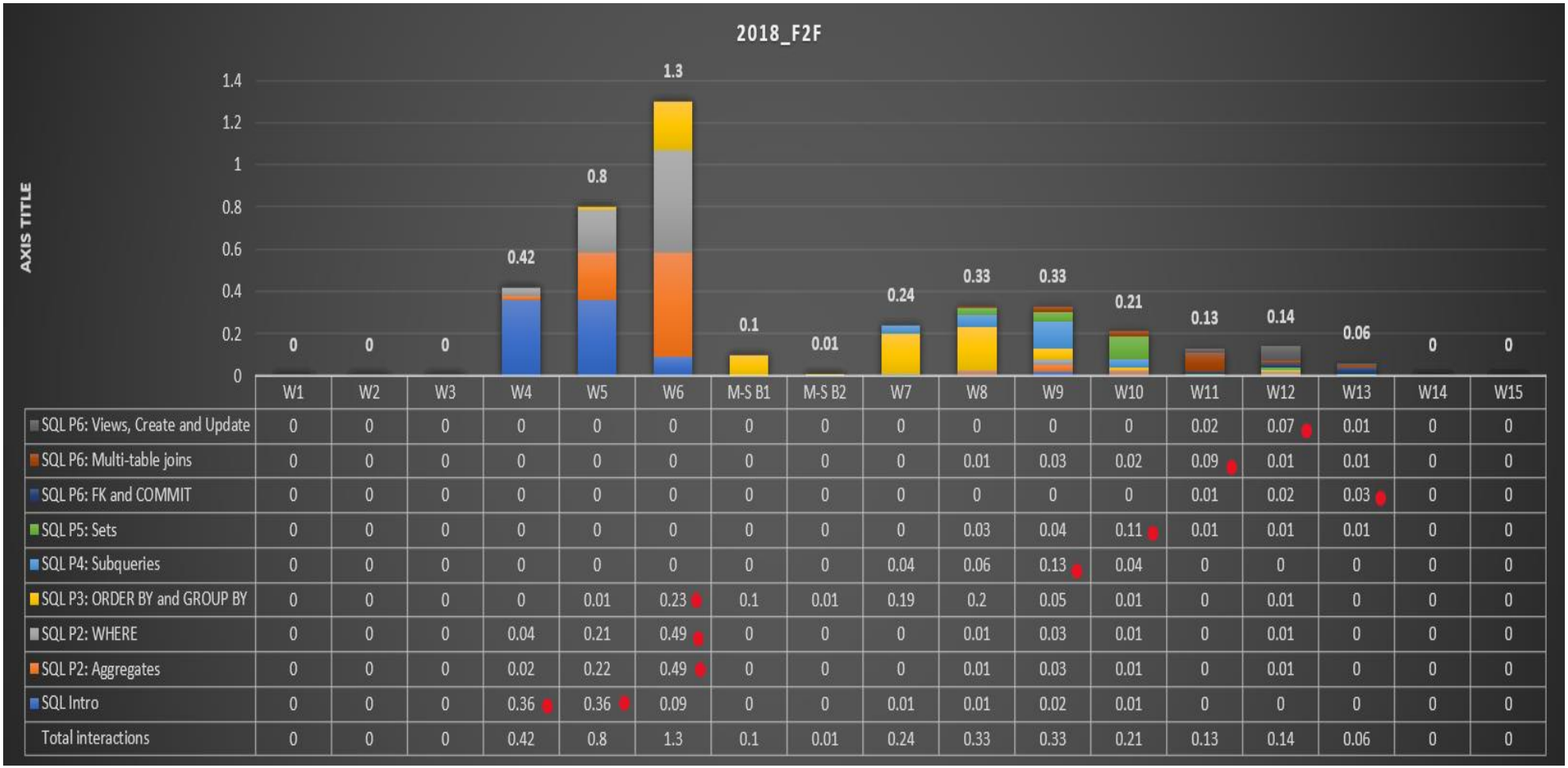
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
The Relational Model	0	0.46	0.38	0.31	0.14	0	0	0	0	0.01	0	0	0	0	0	0	0
Relational Algebra	0	0.42	0.55	0.56	0.13	0.02	0	0	0	0	0	0	0	0	0	0	0
Oral Exam	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.02	0.03
Normalization	0	0	0	0	0	0	0	0	0	0	0.04	0.14	0.08	0	0.02	0.01	0.02
Logical Modelling	0	0	0	0	0.02	0.24	0	0	0.02	0.03	0.02	0.11	0	0.02	0	0	0
Final SQL Quiz	0	0	0	0	0	0	0	0	0	0	0	0	0	0.04	0.06	0	0
ER Modelling	0	0.02	0.2	0.18	0.16	0.06	0	0	0.02	0	0.04	0.02	0	0	0	0	0
EER Modelling	0	0	0	0.28	0.16	0.06	0	0	0.02	0	0.02	0.02	0	0	0	0	0
Database Software Development Lifecycle	0	0.05	0.22	0.16	0.12	0.06	0	0	0.02	0.02	0	0.02	0	0	0	0	0
Conceptual DB Design	0	0	0	0.24	0.18	0.06	0	0	0	0	0.04	0.02	0	0	0	0	0
Background to Databases	0.38	0.82	0.37	0.15	0.03	0.05	0	0	0	0	0	0	0	0	0	0	0
Total interactions	0.38	1.77	1.72	1.88	0.94	0.55	0	0	0.08	0.06	0.16	0.33	0.08	0.06	0.09	0.03	0.05

Figure 9.4. 52 Weekly IPS with muddiest point of theoretical material by 2018_F2F



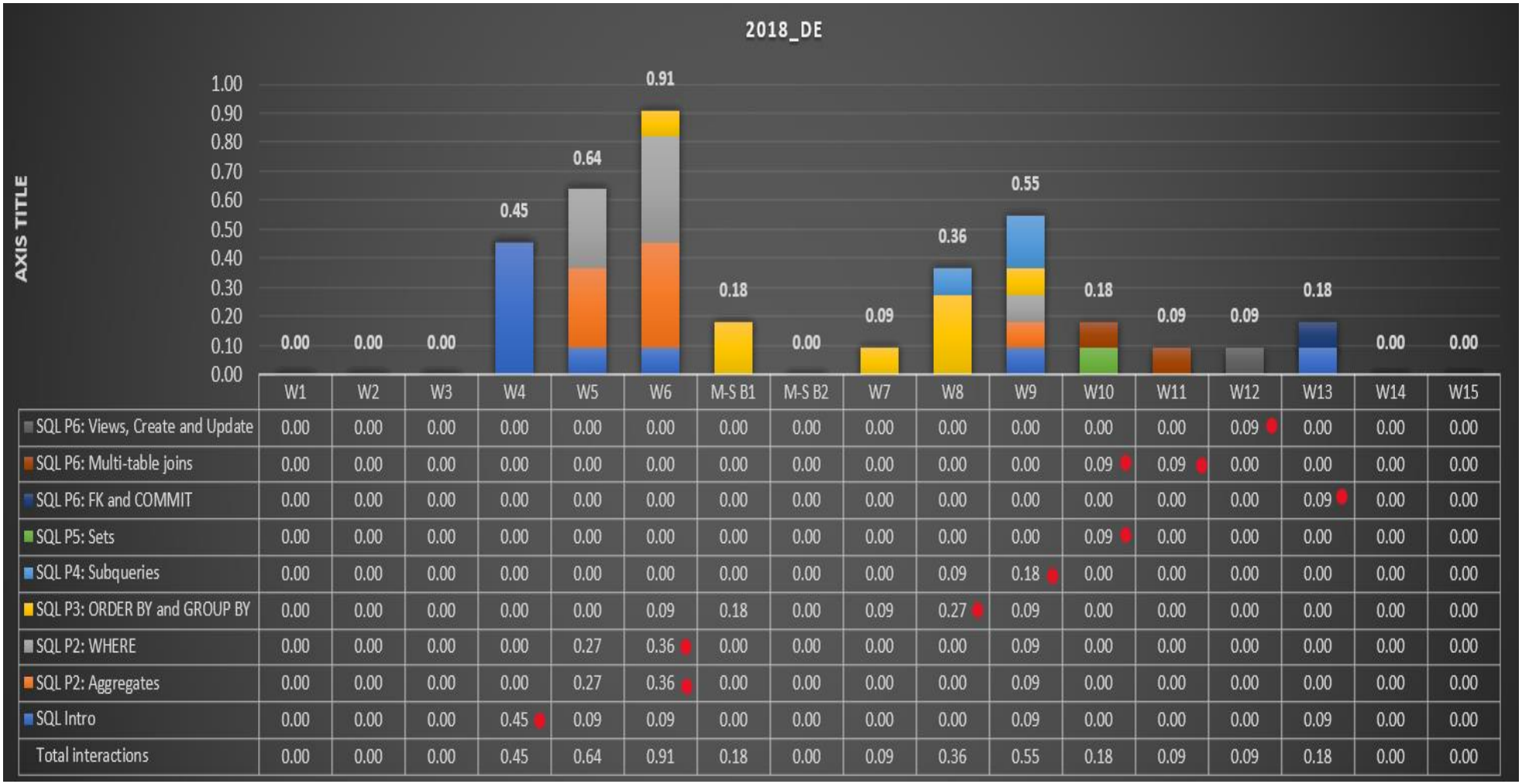
	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
The Relational Model	0.00	0.55	0.73	0.18	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Relational Algebra	0.00	0.82	0.45	0.36	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Oral Exam	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Normalization	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Logical Modelling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00
Final SQL Quiz	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.00	0.00
ER Modelling	0.00	0.00	0.36	0.55	0.00	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EER Modelling	0.00	0.00	0.00	0.36	0.36	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Database Software Development Lifecycle	0.00	0.00	0.36	0.36	0.00	0.18	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Conceptual DB Design	0.00	0.00	0.00	0.18	0.36	0.00	0.00	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Background to Databases	0.64	0.55	0.55	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total interactions	0.64	1.91	2.45	2.09	1.09	0.18	0.00	0.00	0.00	0.73	0.00	0.18	0.00	0.09	0.09	0.00	0.00

Figure 9.4. 53 Weekly IPS with muddiest point of theoretical material by 2018_DE



	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
SQL P6: Views, Create and Update	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0.07	0.01	0	0
SQL P6: Multi-table joins	0	0	0	0	0	0	0	0	0	0.01	0.03	0.02	0.09	0.01	0.01	0	0
SQL P6: FK and COMMIT	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.02	0.03	0	0
SQL P5: Sets	0	0	0	0	0	0	0	0	0	0.03	0.04	0.11	0.01	0.01	0.01	0	0
SQL P4: Subqueries	0	0	0	0	0	0	0	0	0.04	0.06	0.13	0.04	0	0	0	0	0
SQL P3: ORDER BY and GROUP BY	0	0	0	0	0.01	0.23	0.1	0.01	0.19	0.2	0.05	0.01	0	0.01	0	0	0
SQL P2: WHERE	0	0	0	0.04	0.21	0.49	0	0	0	0.01	0.03	0.01	0	0.01	0	0	0
SQL P2: Aggregates	0	0	0	0.02	0.22	0.49	0	0	0	0.01	0.03	0.01	0	0.01	0	0	0
SQL Intro	0	0	0	0.36	0.36	0.09	0	0	0.01	0.01	0.02	0.01	0	0	0	0	0
Total interactions	0	0	0	0.42	0.8	1.3	0.1	0.01	0.24	0.33	0.33	0.21	0.13	0.14	0.06	0	0

Figure 9.4. 54 Weekly IPS with muddiest point of practical material by 2018_F2F



	W1	W2	W3	W4	W5	W6	M-S B1	M-S B2	W7	W8	W9	W10	W11	W12	W13	W14	W15
SQL P6: Views, Create and Update	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00
SQL P6: Multi-table joins	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.00	0.00	0.00	0.00
SQL P6: FK and COMMIT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00
SQL P5: Sets	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00
SQL P4: Subqueries	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.18	0.00	0.00	0.00	0.00	0.00	0.00
SQL P3: ORDER BY and GROUP BY	0.00	0.00	0.00	0.00	0.00	0.09	0.18	0.00	0.09	0.27	0.09	0.00	0.00	0.00	0.00	0.00	0.00
SQL P2: WHERE	0.00	0.00	0.00	0.00	0.27	0.36	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00
SQL P2: Aggregates	0.00	0.00	0.00	0.00	0.27	0.36	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00
SQL Intro	0.00	0.00	0.00	0.45	0.09	0.09	0.00	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.09	0.00	0.00
Total interactions	0.00	0.00	0.00	0.45	0.64	0.91	0.18	0.00	0.09	0.36	0.55	0.18	0.09	0.09	0.18	0.00	0.00

Figure 9.4. 55 Weekly IPS with muddiest point of practical material by 2018_DE